UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE
BOSTON, MASSACHUSETTS 02109-3912

PARTIALLY REVISED FACT SHEET

PARTIALLY REVISED DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

Comment Period: March 25, 2011 – July 22, 2011

NPDES PERMIT N0.: NH0100871

NAME AND ADDRESS OF APPLICANT:

Town of Exeter
Exeter Wastewater Treatment Plant
10 Front Street
Exeter, New Hampshire 03833-2792

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Town of Exeter
Exeter Wastewater Treatment Plant
13 Newfields Road
Exeter, New Hampshire 03833

RECEIVING WATER: Squamscott River (Hydrologic Unit Code: 01060003)

CLASSIFICATION: B

I. Proposed action

a. Decision to Partially Reopen the Permit for Public Comment

In response to a timely application by the Town of Exeter, New Hampshire, for the reissuance of National Pollutant Discharge Elimination System (NPDES) permit number NH0100871, the U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NHDES) made a draft permit and fact sheet available for public notice and comment from October 25, 2007 until November 23, 2007. EPA received comments from the Town of Exeter and the Conservation Law Foundation (CLF).

In its comments on the draft permit, CLF contended that, among other things, the permit failed to ensure compliance with applicable state water quality standards and relevant provisions of the Clean Water Act because it lacked an effluent limitation for total nitrogen (TN).[1] Relying on reports and data indicating that the receiving waters had reached their assimilative capacity for nutrients (e.g., New Hampshire Estuary Project State of Estuaries Report for 2003 and 2006), and citing evidence of existing impairments associated with dissolved oxygen and chlorophyll-a, CLF argued that the permit would result in violations of New Hampshire's narrative nutrient water quality criterion; the state's biological and aquatic community integrity criterion; and its antidegradation policy. CLF, therefore, recommended "nitrogen limits achievable with the most protective limits of technology."

Upon review, EPA has concluded that CLF's comments raise substantial new questions regarding the need to establish an effluent limit for total nitrogen under Clean Water Act Section 301(b)(1)(C), which requires, among other things, the imposition of effluent limitations to ensure that the discharge will not cause or contribute to a violation of state water quality standards, including narrative criteria for water quality. Based on an analysis of these comments and other relevant information, EPA has determined to make certain material changes to the permit. EPA has, in its discretion, decided to reopen the public comment period on the draft permit pursuant to 40 C.F.R. § 124.14(b), because the new permit conditions involve the interpretation and analysis of a significant body of technical and scientific literature not previously discussed on the record. The permittee will, furthermore, need to upgrade its treatment facility in order to comply with the new limits. In light of these facts, EPA has concluded that an opportunity for interested persons to comment on the specific changes to the October 2007 draft permit will assist the agency in its deliberations, provide for greater public participation, and ultimately improve the quality of the final permit decision.

b. Scope of Reopening

In accordance with 40 C.F.R. § 124.14(c), comments filed on this permit during the reopened comment period are limited to the "substantial new questions that caused its reopening," which in this case pertain only to the newly-added effluent limitations and conditions for the control of total nitrogen from the facility (i.e., Parts I.A.1 and I.A.4). Specifically, EPA has determined that a monthly average total nitrogen discharge limit of 3.0 mg/l for the months of April through October and a mass limit of 75 lbs/day based on the concentration limit and the design flow of the treatment facility are necessary to comply with CWA Section 301. In addition to this seasonally-applied numeric limit, the permit requires the permittee to optimize the treatment facility operations for the removal of total nitrogen during the months of November through March using all available treatment equipment at the facility. Because the revised draft permit now contains an effluent limitation for total nitrogen of 3.0 mg/l, the ammonia nitrogen as N summer time

[1] Letter from Thomas F. Irwin, Conservation Law Foundation (CLF) to Dan Arsenault, EPA, and Harry Stewart, New Hampshire Department of Environmental Services (NHDES), re Draft NPDES Permit for Town of Exeter, NH Wastewater Treatment Facility (NPDES Permit No. NH0100871; Public Notice No. NH-001-08), dated November 21, 2007.

limit of 20.5 mg/l has been deleted from the draft permit. In all other respects, the original draft permit and the original Fact Sheet remain in place and are not subject to re-opened comment. All comments received during this notice and the earlier notice will be addressed in the response to comments document prepared as part of the final decision on this permit.

This revised Fact Sheet sets forth the record basis for the new total nitrogen effluent limits. A section entitled "Total Nitrogen" has been added to Section IV.e. (Permit Basis and Explanation of Effluent Limitation Derivation – Non-Conventional Pollutants") of the original Fact Sheet that accompanied the 2007 draft permit (included as Attachment I to this Partially Revised Fact Sheet).

IV. Permit Basis and Explanation of Effluent Limit Derivation

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e. Non-Conventional and Toxic Pollutants

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D. <u>Total Nitrogen</u>

EPA has concluded that at existing levels, nitrogen in the Exeter facility's discharge contribute to water quality violations at the point of discharge in the Squamscott River, as well as further downstream in Great Bay. The analysis of available information by EPA, including the information in the NHDES report "Analysis of Nitrogen Loading Reductions for Wastewater Treatment Facilities and Non Point Sources in the Great Bay Estuary Watershed-Draft" shows that a total nitrogen effluent limitation of 3 mg/l, coupled with significant reductions in non point source discharges of nitrogen is necessary to ensure compliance with water quality standards. EPA is therefore including a monthly average concentration limit of 3 mg/l, applicable during the months of April through October. Also, in accordance with 40 CFR 122.45(f), EPA is imposing a monthly average mass limit of 75 lbs/day, also applicable during the months of April through October. This mass limit is based on the monthly average concentration limit and the design flow of the facility, and represents the highest load that the facility can discharge consistent with achieving water quality standards. The concentration limit will ensure that the treatment facility is operated as efficiently as possible, thus producing a mass discharge load less than the mass limit at flows less than design flow. This is especially important in this watershed, since controls on point source loading alone will not be sufficient to ensure attainment of water quality standards, and controls on nonpoint sources may lag behind treatment plant construction.

While the NHDES nitrogen loading reduction analysis is a year round analysis, EPA has opted not to include nitrogen limits for the timeframe of November through March because these months are not the most critical period for phytoplankton and macro algae growth. As noted earlier, EPA is imposing a condition requiring the permittee to optimize nitrogen removal during the wintertime. The summer limits and the winter optimization requirements will serve to keep the annual discharge load low. In combination, the numeric limitations and the optimization requirements are designed to ensure that the discharge does not cause or contribute to violations of applicable New Hampshire water quality standards, including its narrative water quality criterion for nutrients, in accordance with Section 301(b)(1)(C) of the CWA.

a. Background

1. Ecological Setting: Estuarine Systems Generally; Great Bay; Squamscott River

The Great Bay Estuary is composed of a network of tidal rivers, inland bays, and coastal harbors. The Estuary extends inland from the mouth of the Piscataqua River between Kittery, Maine and New Castle, New Hampshire to Great Bay proper. In all, estuarine tidal waters cover 17 square miles with 144 miles of tidal shoreline. Over forty New Hampshire communities are entirely or partially located within the coastal watershed. The estuary receives treated wastewater effluent from 18 publicly owned treatment works (14 in New Hampshire and 4 in Maine). Great Bay is one of only 28 "estuaries of national significance" under the National Estuary Program (NEP), which was established in 1987 by amendments to the Clean Water Act to identify, restore and protect estuaries along the coasts of the United States. The centerpieces of the estuary are Great Bay and Little Bay. Great Bay proper is a tidally-dominated, complex embayment on the New Hampshire-Maine border. Great Bay is unusual because of its inland location, more than five miles up the Piscataqua River from the ocean**.** It is a popular location for kayaking, birdwatching, commercial lobstering, recreational oyster harvesting, and sportfishing for rainbow smelt, striped bass, and winter flounder. Five tidal rivers discharge into Great Bay and Little Bay: the Winnicut, Squamscott (called the Exeter River above the tidal dam), Lamprey, Oyster, and Bellamy Rivers. Other parts of the Great Bay Estuary include the Upper Piscataqua River (fed by the Cocheco, Salmon Falls, and Great Works Rivers), the Lower Piscataqua River, Portsmouth Harbor, and Little Harbor/Back Channel.

The Great Bay Estuary is a tidally dominated embayment with estuarine waters covering approximately 17 square miles with 144 miles of shoreline. Tidal height ranges from 2.7 meters at the mouth of the estuary to 2.1 meters at the mouth of the Squamscott River. Because of strong tidal currents and mixing, vertical stratification of the estuary is limited. However partial stratification may occur during periods of intense freshwater runoff particularly at the upper tidal reaches of rivers entering the estuary. Observed flushing time for water entering the head of the estuary is 36 tidal cycles (18 days) during high river flow. (Jones, 2000)

The Squamscott River (called the Exeter River above the tidal dam) is one of five tidal rivers that discharge directly into Great Bay. The Squamscott River (below the tidal dam) drains a watershed covering approximately 20 square miles (NHDES(c), 2009) and includes all or portions of the towns of Exeter, Stratham, Newfields, and Newmarket. The Exeter River (above the tidal dam) drains a watershed covering approximately 107 square miles (NHDES, 2010) and includes the towns of Exeter, Hampton Falls, Kensington, East Kingston, Kingston, Hampstead, Sandown, Derry, Candia, Chester, Raymond, Fremont, Danville, and Brentwood.

The Exeter/Squamscott River watershed receives nitrogen loading from “non-point” sources (unregulated stormwater runoff and septic discharges entering surface waters through groundwater) and atmospheric deposition. Additionally, there are two wastewater treatment plants in the towns of Exeter and Newfields which discharge in the lower portion of the watershed and another in Brentwood that discharges seasonally into the upper watershed. The portion of the river which receives effluent from the Exeter and Newfields wastewater treatment plants is tidal.

Estuaries, especially large, productive ones like Great Bay, are extremely significant aquatic resources. An estuary is a partially enclosed coastal body of water located between freshwater ecosystems (lakes, rivers, and streams; freshwater and coastal wetlands; and groundwater systems) and coastal shelf systems where freshwater from the land measurably dilutes saltwater from the ocean. This mixture of water types creates a unique transitional environment that is critical for the survival of many species of fish, birds, and other wildlife. Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land (EPA, 2001).

Maintaining water quality within an estuary is important for many reasons. Estuaries provide a variety of habitats such as shallow open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, tidal pools, and seagrass beds. Tens of thousands of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many species of fish and shellfish rely on the sheltered waters of estuaries as protected places to spawn. Moreover, estuaries also provide a number of recreational values such as swimming, boating, fishing, and bird watching. In addition, estuaries have an important commercial value since they serve as nursery grounds for two thirds of the nation’s commercial fish and shellfish, and support tourism drawing on the natural resources that estuaries supply. (EPA, 1998). Consequently, EPA believes sound environmental policy reasons favor a pollution control approach that is both protective and undertaken expeditiously to prevent degradation of these critical natural resources.

Because estuaries are the intermediary between oceans and land, both of these geographic features influence their physical, chemical, and biological properties. In the course of flowing downstream through a watershed to an estuary, tributaries pick up materials that wash off the land or are discharged directly into the water by land-based activities. Eventually, the materials that accumulate in the tributaries are delivered to estuaries. The types of materials that eventually enter an estuary largely depend on how the land is used. Undisturbed land, for example, will discharge considerably fewer pollutants than an urban center or areas with large amounts of impervious cover. Accordingly, an estuary’s overall health can be heavily impacted by surrounding land uses.

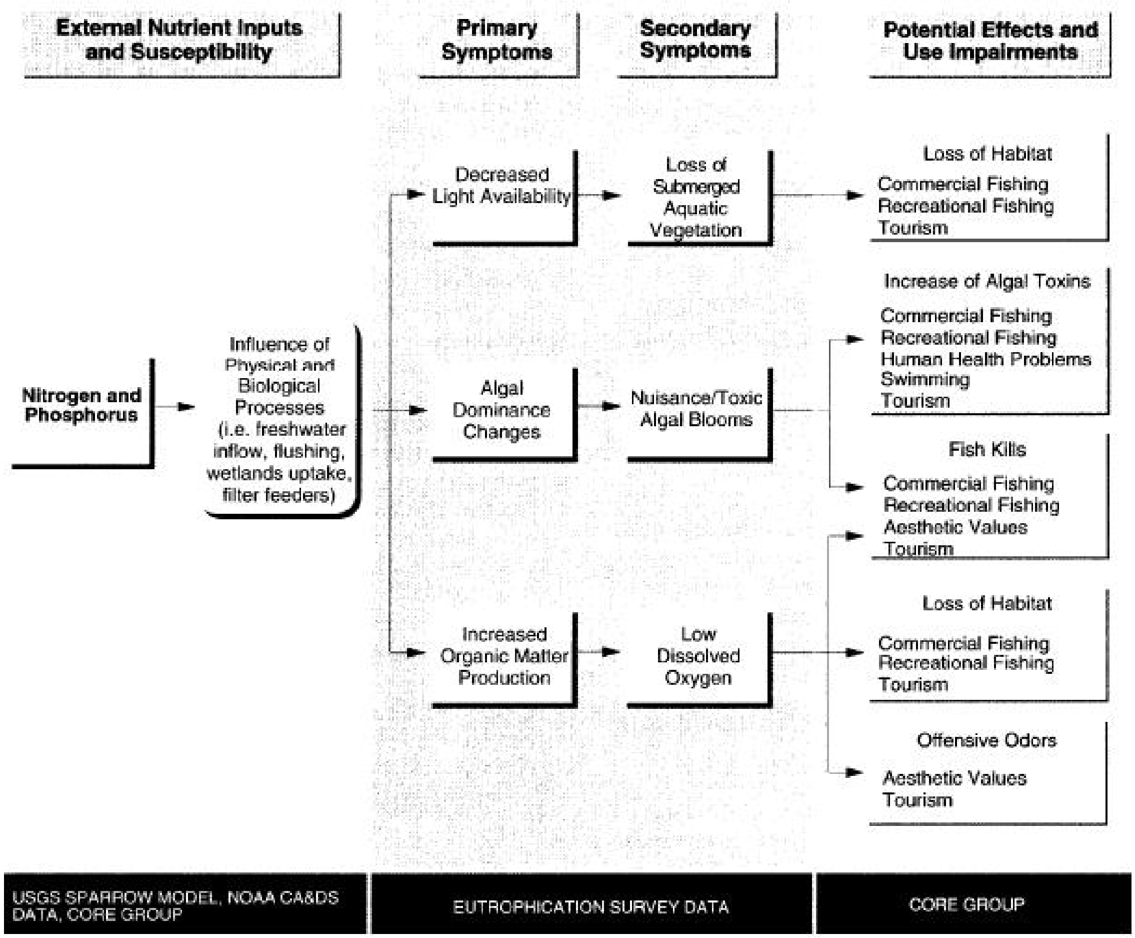
Unlike free-flowing rivers, which tend to flush out sediments and pollutants relatively quickly, an estuary will often have a lengthy retention period as up-estuary saltwater movement interacts with down-estuary freshwater flow (EPA, 2001). Estuaries are particle-rich relative to coastal systems and have physical mechanisms that tend to retain particles. These suspended particles mediate a number of activities (e.g., absorbing and scattering light, or absorbing hydroscopic materials such as phosphate and toxic contaminants). New particles enter with river flow and may be resuspended from the bottom by tidal currents and wind-wave activity. Many estuaries are naturally nutrient-rich because of inputs from the land surface and geochemical and biological processes that act as "filters" to retain nutrients within estuaries (EPA, 2001). Consequently, waterborne pollutants, along with contaminated sediment, may remain in the estuary for a long time, magnifying their potential to adversely affect the estuary's plants and animals.

2. Effects of Nutrients on Estuarine Water Quality

The basic cause of nutrient problems in estuaries and nearshore coastal waters is the enrichment of freshwater with nitrogen (N) and phosphorus (P) on its way to the sea and by direct inputs within tidal systems (EPA, 2001). EPA defines nutrient overenrichment as the anthropogenic addition of nutrients, in addition to any natural processes, causing adverse effects or impairments to beneficial uses of a waterbody. (EPA, 2001). Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody (EPA, 2001). Cultural eutrophication has been defined as the human-induced addition of wastes containing nutrients to surface waters that results in excessive plant growth and/or a decrease in dissolved oxygen. (Env-Wq 1702.15).

Increased nutrient inputs promote a progression of symptoms beginning with excessive growth of phytoplankton and macroalgae to the point where grazers cannot control growth (NOAA, 2007). Phytoplankton is microscopic algae growing in the water column and is measured by chlorophyll *a*. Macroalgae are large algae, commonly referred to as "seaweed." The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as loss of submerged aquatic vegetation, nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In U.S. coastal waters, nutrient overenrichment is a common thread that ties together a diverse suite of coastal problems such as red tides, fish kills, some marine mammal deaths, outbreaks of shellfish poisonings, loss of seagrass and bottom shellfish habitats, coral reef destruction, and hypoxia and anoxia now experienced as the Gulf of Mexico's "dead zone." (EPA, 2001). Figure 1 shows the progression of nutrient impacts on a water body.

Figure 1



Source: EPA, 2001

Estuarine nutrient dynamics are complex and are influenced by flushing time, freshwater inflow and stratification, among other factors. The deleterious physical, chemical, and biological responses in surface water resulting from excessive plant growth impair designated uses in both receiving and downstream waterbodies. Excessive plant growth can result in a loss of diversity and other changes in the aquatic plant, invertebrate, and fish community structure and habitat. For example, losses of submerged aquatic vegetation (SAV), such as eelgrass, occur when light is decreased due to turbid water associated with overgrowth of algae or as a result of epiphyte growth on leaves (NOAA, 2007 and EPA, 2001). Excess nitrogen and phosphorus cause an increased growth of phytoplankton and epiphytes (plants that grow on other plants). Phytoplankton growth leads to increased turbidity, blocking light penetration, and epiphytic growth further blocks sunlight from reaching the SAV surface. When sunlight cannot reach SAV, photosynthesis decreases and eventually the submerged plants die. (State-EPA Nutrient Innovations Task Group, 2009). The loss of SAV can have negative effects on the ecological functioning of an estuary and may impact some fisheries because the SAV beds serve as important habitat. Because SAV responds rapidly to water quality changes, its health can be an indicator of the overall health of the coastal ecosystem.

Nutrient-driven impacts on aquatic life and habitat are felt throughout the eutrophic cycle of plant growth and decomposition. Nutrient-laden plant detritus can settle to the bottom of a water body. In addition to physically altering the benthic environment and aquatic habitat, organic materials (*i.e.*, nutrients) in the sediments can become available for future uptake by aquatic plant growth, further perpetuating and potentially intensifying the eutrophic cycle.

Excessive aquatic plant growth, in addition, degrades aesthetic and recreational uses. Unsightly algal growth is unappealing to swimmers and other stream users and reduces water clarity. Decomposing plant matter also produces unpleasant sights and strong odors. Heavy growths of algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Algae and macrophytes can interfere with angling by fouling fishing lures and equipment. Boat propellers and oars may also get tangled by aquatic vegetation.

When nutrients exceed the assimilative capacity of a water body, the ensuing eutrophic cycle can negatively impact in-stream dissolved oxygen levels. Through respiration, and the decomposition of dead plant matter, excessive algae and plant growth can reduce in-stream dissolved oxygen concentrations to levels that could negatively impact aquatic life. During the day, primary producers (*e.g.*, algae, plants) provide oxygen to the water as a by-product of photosynthesis. At night, however, when photosynthesis ceases but respiration continues, dissolved oxygen concentrations decline. Furthermore, as primary producers die, they are decomposed by bacteria that consume oxygen, and large populations of decomposers can consume large amounts of dissolved oxygen. Many aquatic insects, fish, and other organisms become stressed and may even die when dissolved oxygen levels drop below a particular threshold level.

Nutrient overenrichment of estuaries and nearshore coastal waters from human-based causes is now recognized as a national problem on the basis of Clean Water Act Section 305(b) reports from coastal States (EPA, 2001). Most of the nation's estuarine and coastal waters are moderately to severely polluted by excessive nutrients, especially nitrogen and phosphorus (NOAA, 2007; NOAA, 1999, EPA, 2006; EPA, 2004, EPA; and EPA, 2001).

3. Water Quality Standards Applicable to Squamscott River and Great Bay Estuary

Under New Hampshire Surface Water Quality Regulations, Chapter Env-Wq 1700 et seq. (NH Standards), surface waters are divided into water "use" classifications: Class A and B. RSA 485-A: 8; Env-Wq 1702.11. Great Bay and its tributaries have a water quality classification of B. Class B waters are designated as a habitat for fish, other aquatic life and wildlife and for primary (e.g., swimming) and secondary contact (e.g., fishing and boating) recreation. RSA 485-A: 8, II. Waters in this classification "shall have no objectionable physical characteristics." *Id.* NH Standards also provide that the discharge of sewage or waste "shall not be inimical to aquatic life or to the maintenance of aquatic life in said waters." *Id.* All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters (Env-Wq 1703.01(b)).

Class B waters are subject to class-specific narrative and/or numeric water quality criteria. Env-Wq 1703.01 and 1703.04. With respect to nutrients, Env-Ws 1703.14(b) sets forth a class-specific criterion that prohibits in-stream concentrations of phosphorus or nitrogen in waters that would impair any existing or designated uses. Meanwhile, Env-Wq 1703.14(c) establishes a minimum level of treatment for phosphorus or nitrogen discharges that "encourage cultural eutrophication." Cultural eutrophication is, in turn, defined as "human-induced addition of wastes containing nutrients to surface waters which result in excessive plant growth and/or a decrease in dissolved oxygen." Env-Wq 1702.15. Such discharges must be treated to remove phosphorus or nitrogen to the extent required to ensure and maintain water quality standards. Env-Wq 1703.14(c).

Unless naturally occurring, Class B waters are also prohibited from containing benthic deposits that have a detrimental effect on the benthic community (Env-Wq 1703.08), as well as from having slicks, odors, or surface floating solids (Env-Wq 1703.12) or color in concentrations (Env-Wq 1703.10) that will impair any existing or designated uses. Class B waters also shall not contain turbidity more than 10 NTUs (nephelometric turbidity units) above naturally occurring conditions. See Env-Wq 1703.11. Class B waters, in addition, have a minimum dissolved oxygen saturation requirement of 75% (daily average), and an instantaneous minimum concentration requirement of at least 5 mg/l. See Env-Wq 1703.07(b).

Regardless of classification, NH Standards furthermore require that all surface waters meet certain general water quality criteria. See Env-Wq 1703.03 and 1703.04. All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters (Env-Wq 1703.01(c)). Furthermore, all surface waters must be "free of substances in kind or quantity" that:

a. Settle to form harmful deposits;
b. Float as foam, debris, scum, or other visible substances;
c. Produce odor, color, taste or turbidity which is not naturally occurring and would render it unsuitable for designated uses;
d. Result in dominance of nuisance species; or
e. Interfere with recreational activities.

Env-Wq 1703.03(c)(1)(a)-(e).

Finally, the surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region. Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function. Env-Wq 1703.19(a), (b).

4. Receiving Water Quality Violations

Great Bay and many of the rivers that feed it are approaching, or in the case of the Squamscott River, have reached, their assimilative capacity for nitrogen and are suffering from the adverse water quality impacts of nutrient overenrichment, including cultural eutrophication. They are, consequently, failing to attain the many water quality standards described above. The impacts of excessive nutrients are evident throughout the Great Bay Estuary and the Squamscott River.

Section 303(d) of the Clean Water Act requires states to identify those waterbodies that are not expected to meet surface water quality standards after implementation of technology-based controls. As a result of the documented water quality impairments, portions of the Great Bay Estuary, including its tributaries, have been included on the State of New Hampshire's Section 303(d) list. According to "Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary" (NHDES(a), 2009), the Squamscott River is impaired for dissolved oxygen and biological and aquatic community integrity. According to the 303(d) list, the indicators showing dissolved oxygen impairment are chlorophyll *a*, nitrogen, and instream dissolved oxygen monitoring. The indicators showing biological and aquatic community integrity impairment are estuarine bioassessments for eelgrass, light attenuation coefficient, and nitrogen.

As explained in the Amendment to the Section 303(d) list, relative to the dissolved oxygen criteria (Env-Wq 1703.07), sufficient data were available for assessments for dissolved oxygen, dissolved oxygen saturation, total nitrogen, and chlorophyll-a. All of these indicators except for the dissolved oxygen saturation indicator were categorized as impaired (Non Support) based on their individual criteria. The dissolved oxygen saturation indicator met the criteria for Fully Supporting. This discrepancy is explained by the large diurnal swings in dissolved oxygen that occur in the Squamscott River. These daily fluctuations cause violations of the daily minimum standard but not necessarily the daily average saturation. Such large diurnal swings are another indicator of eutrophication which is consistent with a Non Supporting classification for nitrogen for the Squamscott River. Therefore, following the decision matrix in Table 2 of the NHDES report, nitrogen concentrations in the Squamscott River were categorized as Non Supporting (Category 5-P) relative to preventing violations of the dissolved oxygen standard. (NHDES(a), 2009)

Relative to the Biological and Aquatic Community Integrity criteria as manifested by significant eelgrass loss (Env-Wq 1703.19), the Amendment to the Section 303(d) list explains that sufficient data were available for assessments for eelgrass assessments, total nitrogen, and water clarity. All of these indicators were categorized as impaired (Non Support) based on their individual criteria. There were no conflicting results between the indicators. Therefore, following the decision matrix in Table 2 of the NHDES report, nitrogen concentrations in the Squamscott River were categorized as Not Supporting (Category 5-P) relative to preventing significant eelgrass loss. (NHDES(a), 2009)

There can be only one category assigned to nitrogen for the Aquatic Life designated use. The lower (i.e., worse) category of the two was used in the Assessment Database. For this assessment zone, the lower category for nitrogen was the one for the protection of Biological and Aquatic Community Integrity. (NHDES(a), 2009)

Finally, the Amendment to the Section 303(d) list explains that the historic maps of eelgrass in the Squamscott River show 42.1 acres of habitat in 1948. Median eelgrass cover for the 2006-2008 period was 0 acres. Therefore, 100% of the eelgrass cover in this area has been lost. According to the Amendment, the exact date and cause of the eelgrass loss is unknown. Dredging is not a possible cause as the last channel dredge occurred in 1911 (USACE, 2005). There are no major mooring fields in this assessment zone. Per the assessment methodology, the Squamscott River should be considered impaired for significant eelgrass loss. The previous assessment by NHDES (NHDES, 2008b) came to the same conclusion. (NHDES(a), 2009)

These regulatory findings are consistent with a growing body of technical and scientific literature pointing toward an estuary in environmental decline as a result of nutrient overloading. In 1999, NOAA released the "National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries," which undertook to comprehensively assess the scale, scope, and characteristics of nutrient enrichment and eutrophic conditions in the nation's estuaries. The assessment was based primarily on the results of the National Estuarine Eutrophication Survey, conducted by NOAA from 1992 to 1997, but was supplemented by information on nutrient inputs, population projections, and land use drawn from a variety of sources. It covers 138 estuaries, representing over 90 percent of the estuarine surface area of the coterminous United States. That report concluded that "By the year 2020, eutrophication symptoms are expected to worsen in about one-third of the systems, primarily due to increased nutrient inputs from population increases and the growth of the aquaculture industry. Of these estuaries, St. Croix River/Cobscook Bay, Great Bay, and Plum Island Sound are expected to worsen the most."(NOAA, 1999)

Additionally, NOAA's 1997 Estuarine Eutrophication Survey. Volume 3: North Atlantic Region noted, "In Great Bay, chlorophyll a concentrations range from low to high and turbidity from low to medium. Nuisance and toxic algal blooms have an impact on biological resources in subareas of the mixing and seawater zones. Nitrogen and phosphorus concentrations are medium. There are no observations of anoxia, however hypoxia is reported in small subarea of the mixing zone. SAV coverage ranges from very low to high." (NOAA, 1997). A decade later, NOAA concluded "In Great Bay, increases in dissolved inorganic nitrogen have occurred over the past 20 years. Increases in chlorophyll a and turbidity have been identified with augmented eutrophication in the inner estuary. As a result, eelgrass biomass has declined by 70% in the last 10 years and the occurrence of nuisance macroalgae is becoming more evident. Primary symptoms are high but problems with more serious secondary symptoms are still not being expressed. Nutrient related symptoms observed in the estuary are likely to substantially worsen." (NOAA 2007).

In addition to federal agencies, individual NEPs, including the Piscataqua Region Estuaries Partnership, have collected, compiled and analyzed monitoring data to produce a "State of the Bay" report (typically issued every 3-5 years). These NEP "State of the Bay" reports are critical because they depict status and trends in the estuaries' environmental conditions. To gauge an estuary's health, each NEP develops environmental indicators — "specific, measurable markers that help assess the condition of the environment and how it changes over time." (NHEP, 2003) The environmental indicators relating to excessive levels of nutrients include dissolved oxygen, total nitrogen, and eelgrass.

The Piscataqua Region Estuaries Partnership has released three State of the Estuary Reports, each of which detail, a trend of increasingly concerning nitrogen impairments in Great Bay Estuary.

In its 2003 report, the Partnership noted, "Despite the increasing concentrations of nitrate+nitrite in the estuary, there have not been any significant trends for the typical indicators of eutrophication: dissolved oxygen and chlorophyll-a concentrations. Therefore, the load of nitrate+nitrite to the bay appears to have not yet reached the level at which the undesirable effects of eutrophication occur."[2]

The 2006 report concluded that "more indicators suggest that the ecological integrity of the estuaries is under stress or may soon be heading toward a decline." It observed that "Dissolved oxygen concentrations consistently fail to meet state water quality standards in the tidal tributaries to the Great Bay Estuary." Additionally, the report cautioned, "Nitrogen concentrations in Great Bay have increased by 59 percent in the past 25 years. Negative effects of excessive nitrogen, such as algae blooms and low dissolved oxygen levels, are not evident. However, the estuary cannot continue to receive increasing nitrogen levels indefinitely without experiencing a lowering of water quality and ecosystem changes."

Most recently, in its 2009 report, eleven of 12 environmental indicators show negative or cautionary trends – up from seven indicators classified this way in 2006. According to the 2009 report, total nitrogen is increasing and eelgrass is decreasing within the estuary. The total nitrogen load to the Great Bay Estuary has increased by 42% in the last five years. In Great Bay, the concentrations of dissolved inorganic nitrogen, a major component of total nitrogen, have increased by 44 percent in the past 28 years. Eelgrass

[2] An earlier report—The State of New Hampshire's Estuaries (New Hampshire Estuary Project, 2000) indicates that declining water quality, in part due to nutrient overloading, has been a concerning trend for a decade or more.

cover in Great Bay has declined by 37% between 1990 and 2008 and has disappeared from the tidal rivers, Little Bay, and the Piscataqua River. Dissolved oxygen is currently exhibiting a cautionary trend. While dissolved oxygen standards are rarely violated in the bays and harbors they are often violated in the tidal rivers. The negative effects of the increasing nutrient loads on the estuary system are evident in the decline of water clarity, eelgrass habitat loss, and failure to meet water quality standards for dissolved oxygen concentrations in tidal rivers (PREP, 2009).

According to the report, the most pressing threats to the estuaries relate to population growth and the associated increases in nutrient loads and non-point source pollution (PREP, 2009). Watershed-wide development has created new impervious surfaces at an average rate of nearly 1,500 acres per year. In 2005, there were 50,351 acres of impervious surfaces in the watershed, which is 7.5 percent of the watershed's land area. Nine of the 40 sub watersheds contained over 10 percent impervious cover, indicating the potential for degraded water quality and altered storm water flow. Land consumption per person, a measure of sprawling growth patterns, continues to increase. (PREP, 2009)

Studies by NHDES have also reported evidence of eutrophication due to excessive nitrogen input, including elevated levels of chlorophyll *a* and low levels of dissolved oxygen (NHDES(a), 2009), as well as evidence of increases in nuisance seaweeds and macro-algae (NHDES(b), 2009). As illustrated in the figures below, nitrogen concentrations have increased, water clarity has declined, and substantial quantities of eelgrass have been lost.

Figure 2 shows the gradient of total nitrogen concentrations in Great Bay. Total nitrogen concentrations are highest in the upper parts of the estuary and decline towards the mouth. Corresponding to the trend of total nitrogen concentrations, the greatest losses of eelgrass are being found in the upper parts of the estuary, with decreasing impacts towards the lower portions. Also, the highest levels of chlorophyll *a* and the greatest number of dissolved oxygen criteria violations are experienced in the upper reaches of the estuary where the highest levels of total nitrogen are present.

FIGURE 2: GRADIENT OF NITROGEN CONCENTRATIONS
(Bars indicate range of 10th-90th percentile of samples; dark line indicates median value)

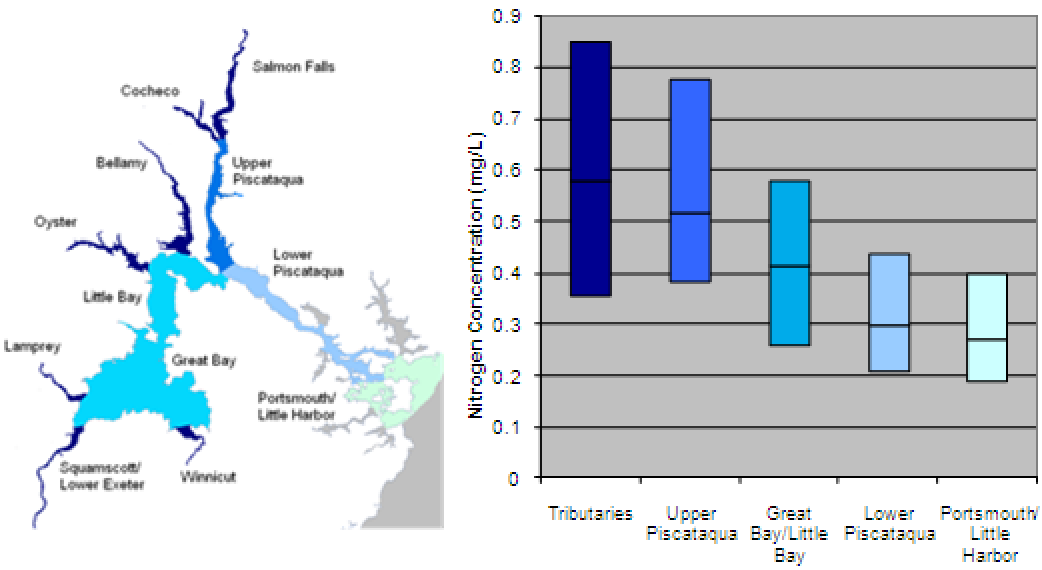
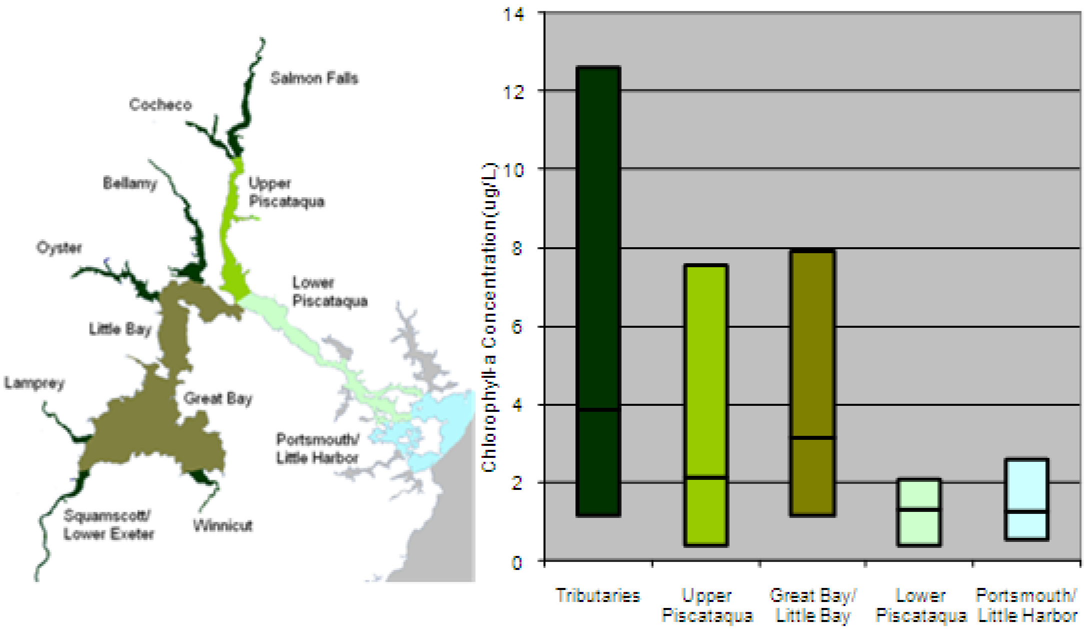


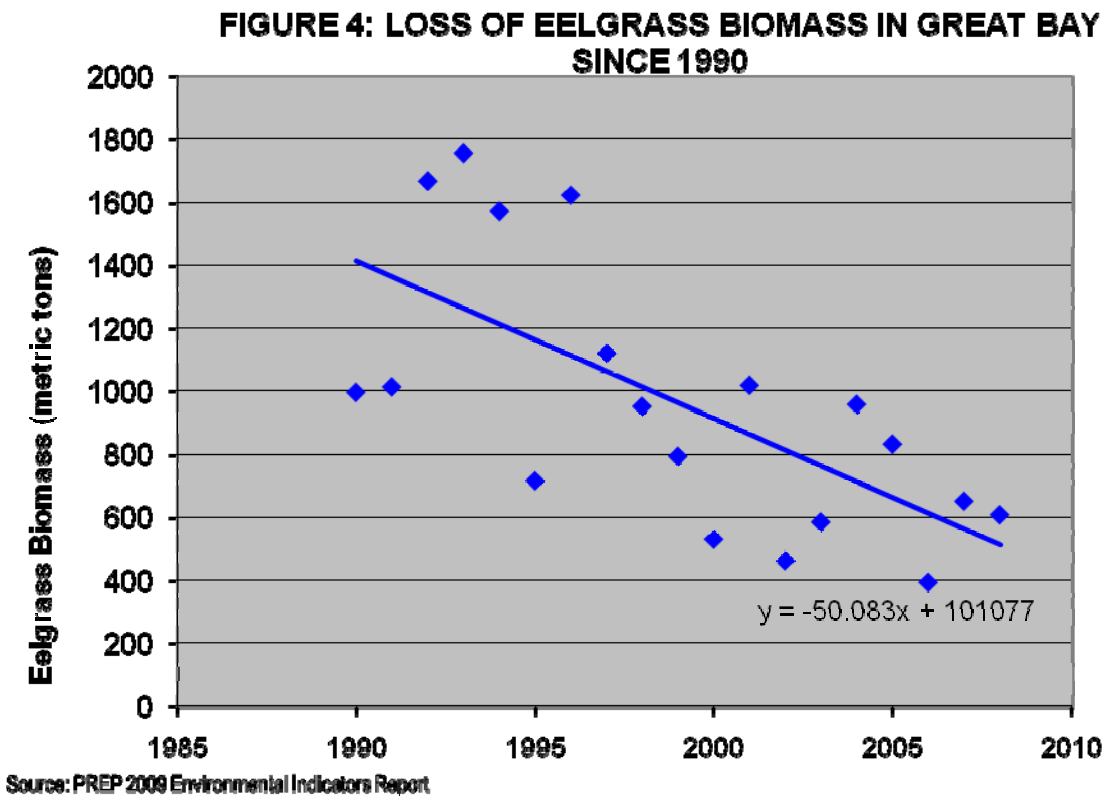
Figure 3 shows the gradient of chloroplyll *a* concentrations in Great Bay. With increasing algal blooms the clarity of the water decreases and this can promote the growth of epiphytes and macroalgae species on and around eelgrass (Burkholder, et al, 2007). Increased levels of algae can also have effects on dissolved oxygen concentrations in the water column. During the day, algae produce oxygen, however in the evenings respiration takes place and depletes dissolved oxygen levels.

FIGURE 3: GRADIENT OF CHLOROPHYLL-A CONCENTRATIONS
(Bars indicate range of 10th-90th percentile of samples; dark line indicates median value)



Elevated nitrogen concentrations can negatively affect seagrasses in direct and indirect ways. Elevated concentrations of nitrate and ammonia have been shown to have direct impacts by disrupting the normal physiology of eelgrass. This disruption of normal physiology leads to reduced growth, reduced disease resistance and mortality (Short and Burdick, 1996, Burkholder et al. 2007). Eelgrass has evolved over time in an environment of low nitrogen availability. Thus, it never developed a positive feedback mechanism to stop or reduce the absorption of available nitrogen. The plants will continually absorb nitrogen and use the molecules to build proteins. Protein synthesis requires carbon and without an off switch for this process, plants exposed to elevated concentrations of nitrogen can exhaust their carbon reserves. The exhaustion of carbon reserves results in plant mortality. Burkholder et al. (2007) reported significant mortality rates (75-95% shoot die-off compared to controls) in plants exposed to nitrate concentrations of <0.05 mg/l nitrate-N. Nitrate concentrations currently exceed this threshold concentration that can cause direct adverse impacts to eelgrass. For example, the median concentration of nitrate at Chapman's Landing in the Squamcott River is 0.165 mg/l nitrate – N (NHDES(b), 2009).

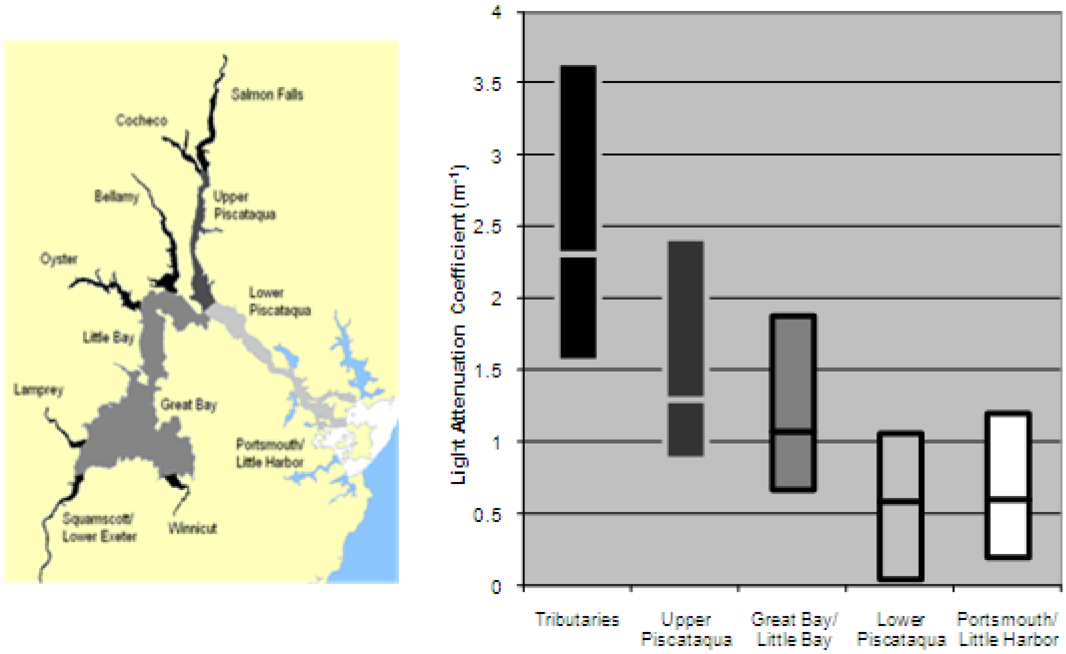
Nitrogen and eelgrass trends in the Great Bay Estuary appear to bear out this relationship. As nitrogen levels have been increasing throughout the estuary for a number of years, eel grass has been also declining (both total acreage and biomass). Dissolved inorganic nitrogen concentrations have increased by 44 percent in the last 28 years (PREP, 2009). See Figure 4.



Nitrogen can indirectly affect eelgrass by negatively impacting light transmission through the water column. Elevated nitrogen concentrations have been implicated in many locations with increased phytoplankton concentrations, proliferation of macroalgae and increased epiphytic load on the plants themselves. All of these outcomes reduce the amount of light making it to the plants, resulting in reduced shoot density, production, growth, depth penetration and mortality. The specific concentrations that trigger these impacts are somewhat waterbody specific, but generally range from 0.2-0.5 mg/l total nitrogen (Burkholder et al. 2007, MADEP/SMAST, 2003). Figure 5 shows the gradient of light attenuation in Great Bay.

FIGURE 5: GRADIENT OF LIGHT ATTENUATION

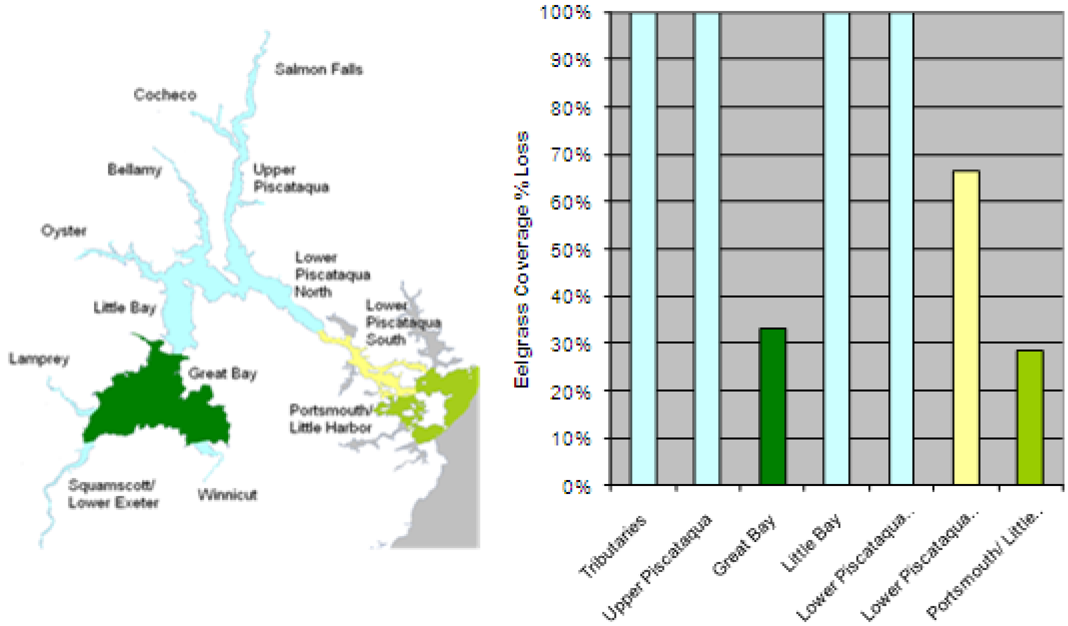
(Bars indicate range of 90th-10th percentile of samples; dark line indicates median value)



[*] The light attenuation coefficient quantifies the rate at which light intensity is lost per meter of depth as a result of all absorbing and scattering components of the water column. The light attenuation of clear water is 0.1 meter.

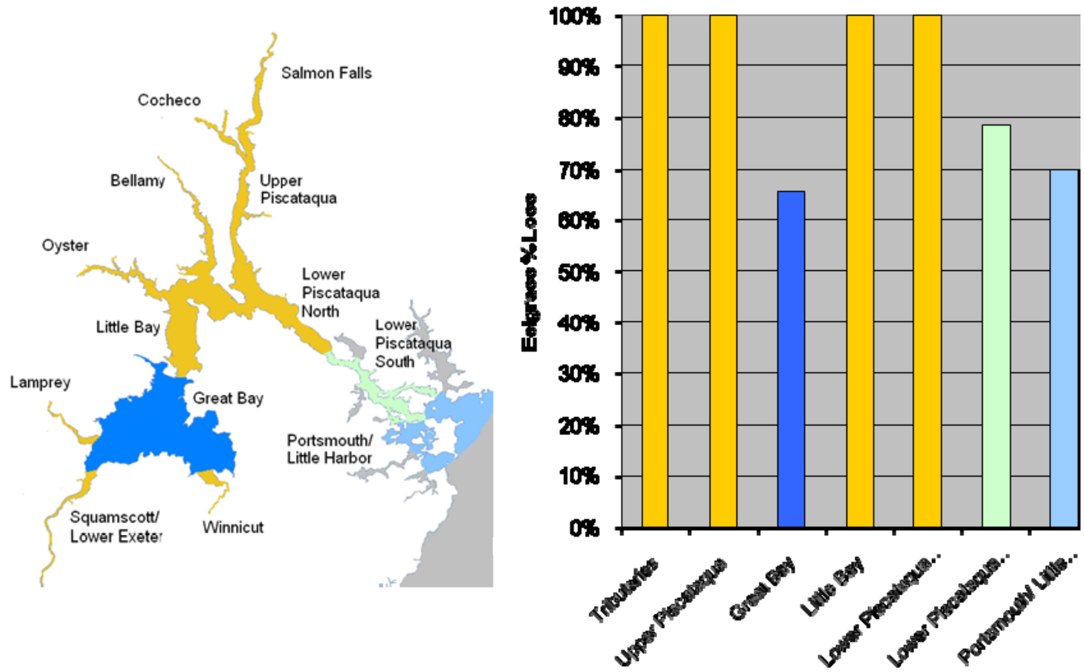
The Great Bay Estuary and its tributaries have experienced dramatic declines in eelgrass coverage in combination with rising water column concentrations of nitrogen and suspended solids. The Squamscott, Lamprey, Oyster, Bellamy and upper Piscataqua rivers in addition to Little Bay have lost 100% of their historical eelgrass habitats (NHDES(a), 2009). Eelgrass cover in Great Bay has declined by 37 % between 1990 and 2008 (PREP, 2009). Figure 6 shows the loss of eelgrass coverage in Great Bay.

FIGURE 6: LOSS OF EELGRASS COVERAGE IN THE GREAT BAY ESTUARY
(Percent loss from peak annual values from 1990 to 2008 values)



Great Bay eelgrass biomass has experienced an even more significant decline than eelgrass cover. Biomass is simply a measurement of the weight of eelgrass per unit area and is one parameter that scientists use to assess the health of a given eelgrass meadow. Between 1990 and 2008, the eelgrass biomass in Great Bay has declined by 64 percent (PREP, 2009). Healthy eelgrass beds perform a wide range of ecological functions including providing critical spawning and nursery habitat for a wide range of fish and shellfish, eelgrass roots and rhizomes stabilize sediments, the meadows reduce coastal erosion, and the plants are important primary producers contributing significant quantities of carbon to the estuarine food web (Thayer, et. al. 1984). The loss of eelgrass biomass results in the impairment of the functions that are provided by healthy eelgrass beds (Evans and Short, 2005; Fonseca, et. al. 1990). Figure 7 shows the loss of eelgrass biomass in Great Bay.

FIGURE 7: LOSS OF EELGRASS BIOMASS IN THE GREAT BAY ESTUARY
(Percent loss from peak annual values from 1990 to 2008 values)



Source: PREP 2009 Environmental Indicators Report

With respect to dissolved oxygen, the bays and harbors within the Great Bay Estuary generally meet the minimum dissolved oxygen standard of 5 mg/l. However, this standard is often violated in the tidal rivers (PREP 2009). For the "Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary" produced by the NHDES, dissolved oxygen measurements from the Squamscott River were analyzed for 530 days. The minimum dissolved oxygen criteria of 5.0 mg/l was violated on 52 days (9.8% of the time) (NHDES(a), 2009).

The Squamscott River has lost 100% of its eelgrass cover. The last documented amount of eelgrass cover in the Squamscott was 42.1 acres in 1948 (NHDES(a), 2009). An aerial survey for eelgrass conducted in 1981 did not detect any eelgrass in the Squamscott River.

5. Reasonable Potential Analysis and Effluent Limit Derivation

Pursuant to 40 C.F.R. § 122.44(d)(1), NPDES permits must contain any requirements in addition to technology-based limits necessary to achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. In addition, limitations "must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) that the Director has determined are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality" (40 C.F.R. § 122.44(d)(1)(i)). An excursion occurs if the actual or projected instream data exceeds any numeric or narrative water quality criterion.

In determining whether a discharge causes or has the reasonable potential to cause or contribute to an excursion above a narrative or numeric criterion within a State water quality standard, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) the variability of the pollutant or pollutant parameter in the effluent; (3) the sensitivity of the species to toxicity testing; (4) where appropriate, the dilution of the effluent in the receiving water; and (5) the statistical approach outlined in the *Technical Support Document for Water Quality-based Toxics Control*, *Section 3* (USEPA, March 1991 [EPA/505/2-90-001]) (see also 40 CFR § 122.44(d)(1)(ii)). In accordance with New Hampshire's Water Quality Standards (RSA 485-A:8 VI, Env-Wq 1705.02(c)), available dilution for tidal waters is equivalent to the conditions that result in a dilution that is exceeded 99% of the time.

Numeric total nitrogen criteria have not yet been adopted into the State of New Hampshire Water Quality Standards. EPA relies therefore on existing narrative criteria to establish effluent permit limitations. When developing an effluent limitation to implement a narrative water quality standard, EPA regulations direct the Agency (in relevant part) to use one or more of the following methodologies:

A. Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such criterion may be derived using a proposed State criterion, or an explicit policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or

B. Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under Section 304(a) of the CWA, supplemented where necessary by other relevant information[.]

40 C.F.R. §§ 122.44(d)(1)(vi)(A), (B). EPA is authorized to base its permitting decision on a wide range of relevant material, including EPA technical guidance, state policies applicable to the narrative water quality criterion, and site-specific studies.

EPA's Nutrient Criteria Technical Guidance Manual – Estuarine and Coastal Marine Waters (EPA, 2001) indicates that dissolved inorganic nitrogen should be less than 0.15 mg/l in order to protect submerged aquatic vegetation. The guidance also explains that because of the recycling of nutrients in the environment it is best to limit total concentrations (i.e. total nitrogen) as opposed to fractions of the total.

The Massachusetts Department of Environmental Protection (MADEP) has identified total nitrogen levels believed to be protective of eelgrass habitats as less than 0.39 mg/l and ideally less than 0.3 mg/l and chlorophyll *a* levels as 3 -5 ug/l and ideally less than 3 ug/l (MADEP/SMAST, 2003). For selected waterbodies, the State of Delaware has adopted a dissolved inorganic nitrogen criteria of 0.14 mg/l as N. This criterion is for the protection of submerged aquatic vegetation and is applicable from March 1 through October 31 (State of Delaware, 2004).

The aquatic life use support criteria proposed by NHDES are consistent with EPA, Massachusetts', and Delaware's guidance. The New Hampshire Department of Environmental Services recently completed a report recommending numeric nitrogen criteria for the Great Bay Estuary (Numeric Nutrient Criteria for the Great Bay Estuary, June 2009). The recommended criteria are for the designated uses of Primary Contact Recreation and Aquatic Life Use Support. As explained in the Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary (NHDES(a), 2009), the numeric nutrient criteria developed by NHDES are "considered numeric translators for the narrative criteria." For the Squamscott River, for aquatic life use support, the proposed total nitrogen criterion for maintaining dissolved oxygen levels is 0.45 mg/l and for maintaining eelgrass habitats is 0.30 mg/l.

Discharges from the Exeter POTW clearly have the reasonable potential to contribute to water quality standards violations based on existing receiving water conditions (accounting for background and available dilution) and the foregoing in-stream targets.

The Squamscott River and the Great Bay Estuary have reached their assimilative capacity for nutrients. Nitrogen enrichment has reached a level where it is adversely affecting the chemical, physical, and biological integrity of the receiving waters. As mentioned, according to "Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary" (NHDES(a), 2009), the Squamscott River is impaired for dissolved oxygen, as indicated by chlorophyll *a*, nitrogen, and instream dissolved oxygen monitoring, and is impaired for biological and aquatic community integrity, as indicated by estuarine bioassessments for eelgrass, light attenuation coefficient, and nitrogen.

The nitrogen and chlorophyll *a* values measured in the Squamscott River are among the highest seen in the Great Bay Estuary. In Great Bay and Little Bay the median total nitrogen levels are 0.42 and 0.41 mg/l, respectively. The median chlorophyll *a* levels are 3.36 and 2.96 ug/l, respectively (chlorophyll *a* ranges are 0.17 – 24.66 ug/l for Great Bay and 0.11 – 13.69 ug/l for Little Bay) (NHDES(b), 2009). By contrast, Portsmouth Harbor, Little Harbor/Back Channel and Sagamore Creek, located in the lower portion of the estuary, have median total nitrogen levels of 0.29, 0.25, and 0.19 mg/l, respectively. The median chlorophyll *a* levels are 1.53, 0.98, and 0.80 ug/l, respectively (chlorophyll *a* ranges are 0.20 – 5.25 ug/l for Portsmouth Harbor, 0.08 – 10.00 ug/l for Little Harbor/Back Channel, and 0.63 – 1.60 ug/l for Sagamore Creek) (NHDES(b), 2009).

For the development of *Numeric Nutrient Criteria for the Great Bay Estuary* report (NHDES(b), 2009), all available water quality data for the Squamscott River collected between 2000 and 2008 were analyzed by NHDES. The median total nitrogen concentration in the river was 0.75 mg/l. The median chlorophyll *a* was 6.8 ug/l with range of 0.20 - 106 ug/l.

A summary of median total nitrogen and chlorophyll *a* data for Squamscott River, Great Bay, Little Bay, Portsmouth Harbor, Little Harbor/Back Channel, and Sagamore Creek is provided below in Table 1. Each of these areas with the exception of Portsmouth Harbor has been placed on the 303(d) list due to significant eelgrass loss. Eelgrass in Portsmouth Harbor has been experiencing a declining trend and is currently classified on the 303(d) list as threatened.

Additionally, Portsmouth Harbor is on the 303(d) list for light attenuation coefficient and nitrogen affecting the biological and aquatic community integrity. Great Bay, Little Bay, and Little Harbor Back Channel are on the 303(d) list for light attenuation coefficient and total nitrogen affecting the biological and aquatic community integrity, and Great Bay also is also on the 303(d) list for dissolved oxygen concentration impairments.

TABLE 1

Location	Total Nitrogen (mg/l)	Total Nitrogen Range (mg/l)	Chlorophyll *a* (ug/l)	Chlorophyll *a* Range (ug/l)
Squamscott River	0.75	0.35 – 1.9	6.75	0.20 – 106
Great Bay	0.42	0.20 – 1.06	3.36	0.17 – 24.66
Little Bay	0.41	0.15 – 1.09	2.96	0.11 – 13.69
Portsmouth Harbor	0.29	0.15 – 0.49	1.53	0.20 – 5.25
Little Harbor/Back Channel	0.25	0.15 – 0.94	0.98	0.08 – 10.00
Sagamore Creek	0.19	0.17 – 1.50	0.80	0.63 – 1.60

The average total nitrogen concentration from the Exeter discharge from February – November 2008 was 14.434 mg/l. The average discharge flow for this time period was 2.11 mgd resulting in an average total nitrogen discharge load of 254 lbs/day (46 tons/yr) (New Hampshire Estuaries Project, 2008). At the design flow of 3.0 mgd the total nitrogen discharge load would be 361 lbs/day (66 tons/yr).

The increase in receiving water total nitrogen concentration currently caused by the Exeter treatment plant at the point of discharge can be estimated by dividing the effluent concentration by the dilution factor. At a discharge concentration of 14.434 mg/l and a dilution factor of 25.2 (see the basis for the dilution factor in the original fact sheet) the resulting receiving water concentration after initial mixing is 0.57 mg/l, which exceeds the target instream concentration of 0.3 mg/l. Since this value only represents the <u>increase</u> in receiving water total nitrogen concentration due to the discharge, the actual receiving water concentration at the point of discharge would be the sum of the existing background plus the increase caused by the discharge. Instream data collected upstream of the tidal dam on the Exeter River, upstream of and uninfluenced by the Exeter discharge, shows that median total nitrogen concentration in the Exeter River is 0.46 mg/l (PREP, 2010 and 2009) which also exceeds the target instream concentration of 0.3 mg/l.

At the proposed total nitrogen effluent limit of 3 mg/l, the estimated increase in receiving water concentration at the point of discharge would be 0.12 mg/l (3/25.2), which is less than the proposed total nitrogen instream target of 0.3 mg/l. However, in order to achieve the target of 0.3 mg/l at the point of discharge significant reductions of nonpoint source loadings of total nitrogen would need to occur.

Significant nitrogen loading reductions from municipal wastewater treatment facilities, in addition to large reductions in non-point sources, are clearly necessary to reverse the trend of declining water quality in the Great Bay Estuary and achieve the ambient nitrogen level targets for protection of aquatic life, including eelgrass habitats.

The permit contains a monthly average total nitrogen discharge limit of 3.0 mg/l for April through October and a mass limit of 75 lbs/day based on the concentration limit and the design flow of the treatment facility. Consistent with the commenter's recommendation, EPA has determined that an initial effluent limitation equal to the limit of technology is appropriate. Additionally, because of the considerable non-point source loads to the Great Bay Estuary watershed, EPA will track efforts to reduce these sources as described later in the fact sheet. (Technology thresholds for nitrogen treatment are typically considered to be 8.0 mg/l total nitrogen for a basic denitrification process, 5.0 mg/l for intermediate levels of denitrification and 3.0 mg/l for advanced levels of denitrification (Chesapeake Bay Program, 2002); the limit of technology for nitrogen treatment is often considered to be 3.0 mg/l. (EPA, 2008)). Additionally, the permit requires that the treatment facility be operated to optimize the removal of total nitrogen during the months of November through March, using all available treatment equipment at the facility. The addition of a carbon source that may be necessary in order to meet the total nitrogen limit during the months of April through October is not required during the months of November through March.

The 3.0 mg/l total nitrogen limit will not cause or contribute to a water quality standards violation, including those parameters identified in the approved Section 303(d) list related to dissolved oxygen and aquatic habitat (eelgrass), in the Great Bay Estuary, provided achievement of the 3.0 mg/1 effluent limitation occurs in conjunction with non-point source and storm water point source reductions within the subwatershed. As previously stated, the total nitrogen criteria proposed by NHDES for aquatic life use support are 0.45 mg/l for maintaining dissolved oxygen and 0.30 mg/l for maintaining eelgrass habitats (NHDES(b), 2009). Since eelgrass was present in the Squamscott River, the applicable total nitrogen criteria to ensure its recovery is 0.30 mg/l. From 2000 to 2008, the median total nitrogen concentration in the Squamscott River was 0.75 mg/l (NHDES(b), 2009) which is significantly higher than the recommended criterion of 0.30 mg/l for the protection of eelgrass habitats. The total nitrogen level for the protection of eelgrass of 0.39 mg/l TN used by the MADEP is exceeded. Additionally, the dissolved inorganic nitrogen threshold of 0.15 mg/l cited in EPA's Nutrient Criteria Technical Guidance

Manual – Estuarine and Coastal Marine Waters and the dissolved inorganic nitrogen water quality standard for the State of Delaware of 0.14 mg/l are also exceeded (the median dissolved organic nitrogen concentration at Chapman's Landing from 2000 – 2008 is 0.29 mg/l (NHDES(b), 2009)).

The necessary magnitude of non-point source and storm water point source reductions has been estimated by the NHDES on an aggregate basis in its report entitled "Analysis of Nitrogen Loading Reductions for Wastewater Treatment Facilities and Non-Point Sources in the Great Bay Estuary Watershed" (NHDES, 2010). For each of the watersheds draining to the Great Bay Estuary, NHDES has proposed watershed nitrogen loading thresholds and percent reduction targets that are expected to result in attainment of water quality standards. The thresholds are based on an analytical, steady state watershed nitrogen loading model that predicts the flushing effect of freshwater and ocean water and thus the total nitrogen load that could be discharged and meet criteria. The average nitrogen loading threshold for the Exeter/Squamscott River watershed that protects all designated uses is a total nitrogen load of 87.8 tons per year while the current total nitrogen load is estimated to be 211.5 tons per year on average (44.3 tons per year point source and 167.3 tons per year non-point source). A 58% reduction in the total load is required to meet applicable criteria in the Exeter/Squamscott River watershed.

Achieving the necessary non-point source and storm water point source reductions will require collaboration between the State of New Hampshire and numerous public, private and commercial watershed stakeholders to: (1) complete total maximum daily load analyses, (2) complete analyses of the costs for controlling these sources, and (3) develop control plans that include:

(a) a description of appropriate financing and regulatory mechanisms to implement the necessary reductions;
(b) an implementation schedule to achieve the reductions (this schedule may extend beyond the term of the permit); and
(c) a monitoring plan to assess the extent to which the reductions are achieved.

Following issuance of the final permit, EPA will review the status of the activities described in (1), (2), and (3) above at 12-month intervals from the date of issuance. In the event the activities described above are not carried out in accordance with this section within the timeframe of the permit (5 years), EPA will reopen the permit and incorporate any more stringent total nitrogen limit required to assure compliance with applicable water quality standards.

VI. State Certification Requirements

The staff of the New Hampshire Department of Environmental Services has reviewed the partially revised draft permit. EPA has requested permit certification by the State pursuant to CWA §401(a)(1) and 40 CFR § 124.53 and expects that the draft permit, as revised, will be certified.

VII. Comment Period, Public Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to:

Dan Arsenault
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100-CMP
Boston, MA 02109-3912
Phone: (617) 918-1562
Fax: (617) 918-0562

In accordance with 40 CFR § 124.14(c), comments filed during the reopened comment period shall be limited to the "substantial new questions that caused its reopening," which in this case pertains only to the implementation of effluent limitations and conditions for the control of total nitrogen from the facility.

The Regional Administrator has determined, pursuant to 40 CFR § 124.12, that a significant degree of public interest exists in the proposed permit and that a public hearing should be held. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after the public hearing, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Permits may be appealed to the Environmental Appeals Board in the manner described at 40 CFR § 124.19.

VIII. EPA Contact

Additional information concerning the draft permit may be obtained between the hours of 9:00 A.M. and 5:00 P.M., Monday through Friday, excluding holidays from:

Dan Arsenault
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100-CMP
Boston, MA 02109-3912
Phone: (617) 918-1562
Fax: (617) 918-0562

3/22/2011

_________________ **Stephen S. Perkins, Director**

Date: **Office of Ecosystem Protection**

U.S. Environmental Protection Agency

References

Burkholder, JA, D.A. Tomasko, and B.W. Touchettte. 2007. Seagrasses and eutrophication. *Journal of Experimental Maine Biology and Ecology*. 350:47-72.

Chesapeake Bay Program – The Nutrient Reduction Technology Task Force, A Stakeholder Group of the Chesapeake Bay Program. 2002. Nutrient Reduction Technology Cost Estimations for Point Sources in the Chesapeake Bay Watershed. Chesapeake Bay Program. November 2002.

Environmental Protection Agency. 1998. Coastal Watershed Factsheets – Estuaries and Your Coastal Watershed. U.S. Environmental Protection Agency, Office of Water, EPA 842-F-98-009. July 1998.

Environmental Protection Agency. 2001. Nutrient Criteria Technical Guidance Manual, Estuarine and Coastal Marine Waters. U.S. Environmental Protection Agency, Office of Water, EPA 822-B-01-003. October 2001.

Environmental Protection Agency. 2006. National Estuary Program Coastal Condition Report. U.S. Environmental Protection Agency, Office of Water/Office of Research and Development. EPA 842/B-06/001. June 2007.

Environmental Protection Agency. 2004. National Coastal Condition Report II. U.S. Environmental Protection Agency, Office of Water/Office of Research and Development. EPA 620/R-03/002. December 2004.

Environmental Protection Agency. 2001. National Coastal Condition Report. U.S. Environmental Protection Agency, Office of Water/Office of Research and Development. EPA 620/R-01/005. September 2001.

Environmental Protection Agency. 2008. Municipal Nutrient Removal Technologies Reference Document, Volume 1 – Technical Report. U.S. Environmental Protection Agency, Office of Wastewater Management, Municipal Support Division, Municipal Technology Branch, EPA 832-R-08-006. September 2008.

Evans, N.T. and F.T. Short. 2005. Functional Trajectory Models for Assessment of Transplant Development of Seagrass, *Zostera marina* L., Beds in the Great Bay Estuary, NH, USA. Estuaries 28: 936-947.

Fonseca, M.S., W.J. Kenworthy, D.R. Colby, K.A. Rittmaster, and G.W. Thayer. Comparisons of Fauna Among Natural and Transplanted Eelgrass *Zostera marina* Meadows: Criteria for Mitigation. Mar. Ecol. Prog. Ser. 65: 251-264.

Jones, Stephen H. 2000. A Technical Characterization of Estuarine and Coastal New Hampshire. New Hampshire Estuaries Project. 2000.

Massachusetts Department of Environmental Protection, UMASS-Dartmouth School for Marine Science and Technology. 2003. Massachusetts Estuaries Project: Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators Interim Report. Massachusetts Department of Environmental Protection. July 21, 2003. Revised September 16, 2003 and December 22, 2003.

National Oceanic and Atmospheric Administration (NOAA). 2007. Effects of Nutrient Enrichment in the Nations Estuaries: A Decade of Change. NOAA Coastal Ocean Program Decision Analysis Series No. 26. National Centers for Coast Ocean Science, Silver Spring, MD. 2007

National Oceanic and Atmospheric Administration (NOAA). 1997. NOAA Estuarine Eutrophic Survey. Volume 3: North Atlantic Region. National Oceanic and Atmospheric Administration. 1997.

National Oceanic and Atmospheric Administration (NOAA). 1999. National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries. National Oceanic and Atmospheric Administration. 1999.

New Hampshire Estuaries Project. 2000. The State of New Hampshire's Estuaries. New Hampshire Estuaries Project. February, 2000.

New Hampshire Estuaries Project. 2003. 2003 State of the Estuaries. New Hampshire Estuaries Project. 2003.

New Hampshire Estuaries Project. 2006. 2006 State of the Estuaries. New Hampshire Estuaries Project. 2006.

New Hampshire Estuaries Project. 2008. Total Nitrogen Concentrations in Wastewater Treatment Plant Effluent in the Great Bay Estuary Watershed in 2008. New Hampshire Estuaries Project. December 31, 2008.

New Hampshire Department of Environmental Services (a). 2009. Amendment to the New Hampshire 2008 Section 303(d) List Related to Nitrogen and Eelgrass in the Great Bay Estuary. NHDES-R-WD-09-14. New Hampshire Department of Environmental Services, Water Division, Watershed Management Bureau, Concord, NH. August 13, 2009.

New Hampshire Department of Environmental Services (b). 2009. Numeric Nutrient Criteria for the Great Bay Estuary. NHDES-R-WD-09-12. New Hampshire Department of Environmental Services, Water Division, Watershed Management Bureau. June 2009.

New Hampshire Department of Environmental Services. 2010. Analysis of Nitrogen Loading Reductions for Wastewater Treatment Facilities and Non-Point Sources in the Great Bay Estuary Watershed– Draft. New Hampshire Department of Environmental Services, Water Division, Watershed Management Bureau, Concord, NH. November 2010.

Piscataqua Region Estuaries Partnership. 2009. State of the Estuaries 2009. Piscataqua Region Estuaries Partnership, University of New Hampshire, Durham, NH. 2009.

Piscataqua Region Estuaries Partnership. 2009. Environmental Indicators Report 2009. Piscataqua Region Estuaries Partnership, University of New Hampshire, Durham, NH. June 2009.

Piscataqua Region Estuaries Partnership. 2009. Nitrogen, Phosphorus and Suspended Solids Concentrations in Tributaries to the Great Bay Estuary Watershed in 2008. Piscataqua Region Estuaries Partnership, University of New Hampshire, Durham, NH. March 31, 2009.

Piscataqua Region Estuaries Partnership. 2010. Nitrogen, Phosphorus, and Suspended Solids Concentrations in Tributaries to the Great Bay Estuary Watershed in 2009. Piscataqua Region Estuaries Partnership, University of New Hampshire, Durham, NH. June 25, 2010.

Short, Frederick T., Burdick, David M. 1996. Quantifying Eelgrass Habitat Loss in Relation to Housing Development and Nitrogen Loading in Waquoit Bay, Massachusetts. Estuarine Research Federation. Vol. 19, No. 3 p. 730 – 739. September 1996.

State-EPA Nutrient Innovations Task Group. 2009. An Urgent Call to Action, Report of the State – EPA Nutrient Innovations Task Group. State-EPA Nutrient Innovations Task Group. August 2009.

State of Delaware – Department of Natural Resources and Environmental Control. 2004. State of Delaware Surface Water Quality Standards. State of Delaware – Department of Natural Resources and Environmental Control. July 11, 2004.

Thayer, G.W., W.J. Kenworthy, and M.S. Fonseca. 1984. The ecology of eelgrass meadows of the Atlantic coast: a community profile. U.S. Fish and Wildlife Service. FWS/OBS-84/02. Reprinted September 1985.

Attachment 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGION
ONE CONGRESS STREET
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO.: NH0100871

PUBLIC NOTICE START/FINISH DATE:

NAME AND MAILING ADDRESS OF APPLICANT:

Town of Exeter
Exeter Wastewater Treatment Plant
10 Front Street
Exeter, New Hampshire 03833-2792

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Town of Exeter
Exeter Wastewater Treatment Plant
13 Newfields Road
Exeter, New Hampshire 03833

RECEIVING WATER: Squamscott River (Hydrologic Unit Code: 01060003)

CLASSIFICATION: B

TABLE OF CONTENTS

I. Proposed Action, Type of Facility, and Discharge Location.

The above named applicant has applied to the U.S. Environmental Protection Agency (EPA) for reissuance of its NPDES permit to discharge treated effluent into the designated receiving water. The facility is engaged in the collection and treatment of domestic and industrial wastewaters. Secondary treatment is provided by three aerated lagoons. Prior to discharging to the Squamcott River through Outfall 001 the effluent is chlorinated and dechlorinated. The facility has a design flow of 3.0 mgd.

The previous permit was issued on July 5, 2000 and expired on September 25, 2005. The expired permit ("existing permit") has been administratively extended because the applicant filed a complete application for permit reissuance pursuant to 40 Code of Federal Regulations (C.F.R.) Section 122.6.

The location of the facility, outfalls, and the receiving waters are shown in Attachment A.

II. Description of Discharge.

A quantitative description of significant effluent parameters based on Discharge Monitoring Reports (DMRs) is shown in Attachment B. The data are from October 2000 through April 2006.

III. Limitations and Conditions.

Effluent limitations and monitoring requirements are found in PART I of the draft NPDES permit.

IV. Permit Basis and Explanation of Effluent Limitation Derivation.

a. General Regulatory Background

Congress enacted the Clean Water Act (CWA), "to restore and maintain the chemical physical, and biological integrity of the Nation's waters." CWA § 101(a). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into waters of the United States from any point source, except as authorized by specified permitting sections of the CWA, one of which is Section 402. See CWA §§ 301(a) and 402(a). Section 402 establishes one of the CWA's principal permitting programs, the National Pollutant Discharge Elimination System (NPDES). Under this section of the CWA, EPA may "issue a permit for the discharge of any pollutant, or combination of pollutants" in accordance with certain conditions. See CWA § 402(a). NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements. See CWA § 402(a)(1)-(2).

Section 301 of the CWA provides for two types of effluent limitations to be included in NPDES permits: "technology-based" limitations and "water quality-based" limitations. See CWA §§ 301, 303, 304(b); 40 C.F.R. Parts 122, 125, 131. Technology-based limitations, generally developed on an industry-by-industry basis, reflect a specified level of pollutant reducing technology available and economically achievable for the type of facility being permitted. See CWA § 301(b). As a class, POTWs must meet performance based requirements based on available wastewater treatment technology. CWA § 301(b)(1)(B). The performance level for POTWs is referred to as "secondary treatment". Secondary treatment is comprised of technology-based requirements expressed in terms of BOD_5, TSS, and pH. 40 C.F.R. Part 133.

Water quality-based effluent limits are designed to ensure that state water quality standards are met regardless of the decision made with respect to technology and economics in establishing technology-based limitations. In particular, Section 301(b)(1)(C) requires achievement of, "any more stringent limitation, including those necessary to meet water quality standards…established pursuant to any State law or regulation…" See 40 C.F.R. §§ 122.4(d), 122.44(d)(1) (providing that a permit must contain effluent limits as necessary to protect State water quality standards, "including State narrative criteria for water quality")(emphasis added) and 122.45(d)(5) (providing in part that a permit incorporate any more stringent limits required by Section 301(b)(1)(C) of the CWA).

The CWA requires that States develop water quality standards for all water bodies within the State. CWA § 303. These standards have three parts: (1) one or more "designated uses" for each water body or water body segment in the state; (2) water quality "criteria" consisting of numerical concentration levels and/or narrative statements specifying the amounts of various pollutants that may be present in each water body without impairing the designated uses of that water body; and (3) an antidegradation provision, focused on protecting high quality waters and protecting and maintaining water quality necessary to protect existing uses. CWA § 303(c)(2)(a); 40 C.F.R. § 131.12. The limits and conditions of the permit reflect the goal of the CWA and EPA to achieve and then to maintain water quality standards.

The applicable New Hampshire water quality standards can be found in Surface Water Quality Regulations, Chapter Env-Ws 1700 et seq. See generally, Title 50, Water Management and Protection, Chapter 485A, Water Pollution and Waste Disposal Section 485-A. Hereinafter, New Hampshire's Surface Water Quality Regulations are referred to as the NH standards.

Receiving stream requirements are established according to numerical and narrative standards adopted under state law for each stream classification. When using chemical-specific numeric criteria from a State's water quality standards to develop permit limits, both the acute and chronic aquatic life criteria are used and expressed in terms of maximum allowable in stream pollutant concentrations. Acute aquatic life criteria are generally implemented through maximum daily limits and chronic aquatic life criteria are generally implemented through average monthly limits. When a State has not established a numeric water quality criterion for a specific pollutant that is present in the effluent in a concentration that causes or has a reasonable potential to cause a violation of narrative water quality standards, the permitting authority must establish effluent limits in one of three ways: based on a "calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use"; on a "case-by-case basis" using CWA § 304(a) recommended water quality criteria, supplemented as necessary by other relevant information; or in certain circumstances, based on an "indicator parameter". 40 C.F.R. § 122.44(d)(1)(vi)(A-C).

All statutory deadlines for meeting various treatment technology-based effluent limitations established pursuant to the CWA have expired. When technology-based effluent limits are included in a permit, compliance with those limitations is from the date the issued permit becomes effective. See 40 C.F.R. § 125.3(a)(1). Compliance schedules and deadlines not in accordance with the statutory provisions of the CWA cannot be authorized by an NPDES permit. The regulations governing EPA's NPDES permit program are generally found in 40 C.F.R. Parts 122, 124, and 136.

b. Introduction

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality standard, including narrative water quality criteria. See 40 C.F.R. 122.44(d)(1). An excursion occurs if the projected or actual in-stream concentration exceeds the applicable criterion.

A. Reasonable Potential

In determining reasonable potential, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentration and variability in the effluent and receiving water as determined from permit applications, monthly discharge monitoring reports, and State and Federal water quality reports; (3) sensitivity of the species to toxicity testing; (4) statistical approach outlined in *Technical Support Document for Water Quality-based Toxics Controls*, March 1991, EPA/505/2-90-001 in Section 3; and where appropriate, (5) dilution of the effluent in the receiving water. In accordance with New Hampshire Standards (RSA 485-A:8VI, Env-Ws 1705.02), available dilution for rivers and streams is based on a known or estimated value of the lowest average flow which occurs for seven (7) consecutive days with a recurrence interval of once in ten (10) years (7Q10) for aquatic life and human health criteria for non-carcinogens, or the long-term harmonic mean flow for human health (carcinogens only) in the receiving water at the point just upstream of the outfall. Furthermore, 10 percent of the receiving water's assimilative capacity is held in reserve for future needs in accordance with New Hampshire's Surface Water Quality Regulations Env-Ws 1705.01.

B. Anti-backsliding

Section 402(o) of the CWA generally provides that the effluent limitations of a renewed, reissued, or modified permit must be at least as stringent as the comparable effluent limitations in the previous permit. Except under certain limited circumstances, "backsliding" from effluent limitations contained in previously issued permits is prohibited. EPA has also promulgated anti-backsliding regulations which are found at 40 C.F.R. § 122.44(l).

C. State Certification

Section 401(a)(1) of the CWA requires all NPDES permit applicants to obtain a certification from the appropriate state agency stating that the permit will comply with all applicable federal effluent limitation and state water quality standards. See CWA § 401(a)(1). The regulatory provisions pertaining to state certification provide that EPA may not issue a permit until a certification is granted or waived by the state in which the discharge originates. 40 C.F.R. § 124.53(a). The regulations further provide that, "when certification is required…no final permit shall be issued…unless the final permit incorporated the requirements specified in the certification under § 124.53(e)." 40 C.F.R. § 124.55(a)(2). Section 124.53(e) in turn provides that the State certification shall include "any conditions more stringent than those in the draft permit which the State finds necessary" to assure compliance with, among other things, State water quality standards, see 40 C.F.R. 124.53(e)(2), and shall also include "[a] statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of State law, including water quality standards," see 40 C.F.R. 124.53(e)(3).

However, when EPA reasonably believes that a State water quality standard requires a more stringent permit limitation than that reflected in a state certification, it has an independent duty under CWA §301(b)(1)(C) to include more stringent permit limitations. See 40 C.F.R. §§ 122.44(d)(1) and (5). It should be noted that under CWA § 401, EPA's duty to defer to considerations of State law is intended to prevent EPA from relaxing any requirements, limitations, or conditions imposed by State law. Therefore, "[a] State may not condition or deny a certification on the grounds that State law allows a less stringent permit condition." 40 C.F.R. § 124.55(c). In such an instance, the regulations provide that, "The Regional Administrator shall disregard any such certification conditions or denials as waivers of certification." Id. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 C.F.R. § 122.4(d) and 40 C.F.R. § 122.44(d).

c. Flow

The Exeter Wastewater Treatment Plant has a design flow of 3.0 mgd. This flow rate is used to calculate available dilution and mass limits for BOD_5 and TSS as discussed below. If the effluent flow rate exceeds 80 percent of the 3.0 mgd design flow (2.4 mgd) for a period of three (3) consecutive months then the permittee must notify EPA and the NHDES-WD and implement a program to maintain satisfactory treatment levels.

d. Conventional Pollutants

A. BOD$_5$ and TSS

Average monthly and average weekly concentration (i.e. mg/l) effluent limits in the draft permit for Biochemical Oxygen Demand (BOD$_5$) and Total Suspended Solids (TSS) are based on requirements of Section 301(b)(1)(B) of the CWA as defined in 40 C.F.R. §133.102. The average monthly, average weekly and maximum daily concentration limits for BOD$_5$ and TSS are the same as the limits in the existing permit, consistent with the anti-backsliding requirement found in 40 C.F.R. §122.44.

The draft permit also contains average monthly, average weekly, and maximum daily mass (i.e. lbs/day) for BOD$_5$ and TSS. Mass limits are incorporated into the permit based on 40 C.F.R. §122.45(f). These mass limits were calculated using the appropriate concentration limits and the design flow of the facility. Refer to Attachment C for the calculation of these limits.

The percent removal requirements for the existing permit were based upon 40 C.F.R. §133.105 (Treatment Equivalent to Secondary Treatment). Presently, the permittee is required to maintain 70% removal for BOD$_5$ and 65% for TSS. These limits have been carried forward to the draft permit.

B. pH

The pH limit range of 6.5 – 8.0 S.U. in the draft permit remain unchanged from the existing permit. Language under State Permit Conditions (PART I.D.1.a.) allows for a change in the pH limit under certain conditions. A change would be considered if the applicant can demonstrate to the satisfaction of NHDES-WD that the pH standard of the receiving water will be protected when the discharge is outside the permitted range, then the applicant or NHDES-WD may request (in writing) that the permit limits be modified by EPA to incorporate the results of the demonstration. Anticipating the situation where NHDES-WD grants a formal approval changing the pH limit to outside 6.5 to 8.0 Standard Units (S.U.), EPA has added a provision to the draft permit (see SPECIAL CONDITIONS section). That provision will allow EPA to modify the pH limit using a certified letter approach. This change will be allowed only if it is demonstrated that the revised pH limit range does not alter the naturally occurring receiving water pH. However, the pH limit range cannot be less restrictive than 6.0 to 9.0 S.U. found in the applicable National Effluent Limitation Guideline (Secondary Treatment Regulations in 40 C.F.R. Part 133) for the facility.

C. Bacteria

New Hampshire State statue N.H. RSA 485-A:8,V, specifies that the bacteria standard shall be "...as recommended under the National Shellfish Program Manual of Operation, United States Department of Food and Drug Administration." This standard applies to facilities which discharge to tidal waters used for growing or taking of shellfish for human consumption, and therefore applies to the Exeter Wastewater Treatment Plant. The recommended criteria for fecal coliform bacteria is 14 colonies per 100 milliliters. Additionally, not more than 10 percent of the collected samples shall exceed a most probable number (MPN) of 43 per 100 milliliters for a 5-tube decimal dilution test. The NHDES-WD has determined that the fecal coliform value of 14 colonies per 100 milliliters applies to NPDES permits as an average monthly limit and that the permits should also contain a condition to report maximum daily values. The report-only requirement is needed to monitor the variation in data to properly assess compliance with the requirement that not more that 10 percent of the samples exceed the MPN of 43. The average monthly limit is determined by calculating the geometric mean of the daily sample values.

N.H RSA 485-A:8,V also requires enterococci bacteria limits for discharges to "tidal waters utilized for swimming purposes." However, EPA is not requiring numerical enterococci bacteria limits in the permit. Rather, EPA is imposing a report only enterococci requirement. EPA believes this is appropriate because there are no readily apparent swimming areas in the area of the discharge. Collecting bacteria data from the treatments plant's effluent will allow EPA and NHDES-WD to evaluate potential enterococci impacts on the receiving water.

e. Non-Conventional and Toxic Pollutants

Water quality based limits for specific toxic pollutants were determined from numeric chemical specific criteria derived from extensive scientific studies. The EPA has summarized and published specific toxic pollutants and their associated toxicity criteria in *Quality Criteria for Water*, 1986, EPA440/5-86-001 as amended, commonly known as the federal "Gold Book". Each pollutant generally includes an acute aquatic life criteria to protect against short term effects, such as death, and a chronic aquatic life criteria to protect against long term effects, such as poor reproduction or impaired growth. New Hampshire adopted these "Gold Book" criteria, with certain exceptions, and included them as part of the State's Surface Water Quality Regulations adopted on December 10, 1999. EPA uses these pollutant specific criteria along with available dilution in the receiving water to determine a pollutant specific draft permit limit.

A. Available Dilution

In February of 2002, the Town of Exeter extended Outfall 001 to the middle of the Squamscott River. The end of the outfall extension consists of a 40 foot multiport diffuser consisting of eight ports. This project was completed on February 12, 2002. The NHDES-WD performed modeling of the new outfall configuration using CORMIX-GI and determined the dilution factor to be 25.2. Water quality based limits for the existing permit and the draft permit have been calculated using this dilution factor.

B. Total Chlorine Residual

The New Hampshire water quality standards specify the chronic and acute aquatic-life criterion for chlorine at 0.011 mg/l and 0.019 mg/l, respectively, for freshwater; and 0.0075 mg/l and 0.013 mg/l, respectively, for marine water. The Exeter WWTP discharges to a tidal river, thus the marine standards apply. Based upon available dilution, applicable total residual chlorine limits are a monthly average limit of 0.19 mg/l (0.0075 mg/l * 25.2) and a daily maximum limit of 0.33 mg/l (0.013 mg/l * 25.2).

C. Ammonia Nitrogen as N

The existing permit based the ammonia limitations on New Hampshire standards found at Env-Ws 1703.26 through 1703.31. The salt water ammonia criteria are a function of temperature, pH, and salinity. Based upon data from the Jackson Estuarine Laboratory, values of 20° C, 8.0 S.U., and 15 g/kg and 5° C, 8.0 S.U., and 10 g/kg were used for the summer and winter periods, respectively. Based upon this information, the acute and chronic ammonia criteria (in terms of NH_3 per liter) for the summer period are 6.6 and 0.99 mg/l and for the winter period are 19 and 2.9 mg/l. In order to convert the ammonia criteria (in terms of NH_3 per liter) to ammonia nitrogen as N criteria, the ammonia criteria is multiplied by 0.822. Based upon a dilution of 25.2 applicable permit limits would be:

Summer Chronic => (25.2)*(0.99 mg/l)*(0.822) = 20.5 mg/l

Summer Acute => (25.2)*(6.6 mg/l)*(0.822) = 136.7 mg/l

Winter Chronic => (25.2)*(2.9 mg/l)*(0.822) = 60.1 mg/l

Winter Acute => (25.2)*(19 mg/l)*(0.822) = 393.6 mg/l

Consistent with the existing permit, the draft permit contains a monthly average summer limit of 20.5 mg/l and a reporting requirement for the summer daily maximum, winter monthly average, and winter daily maximum.

f. Whole Effluent Toxicity

EPA's **<u>Technical Support Document for Water Quality Based Toxics Control,</u>** EPA/505/2-90-001, March 1991, recommends using an "integrated strategy" containing both pollutant (chemical) specific approaches and whole effluent (biological) toxicity approaches to control toxic pollutants in effluent discharges from entering waters of the U.S.. EPA-New England adopted this "integrated strategy" on July 1, 1991, for used in permit development and issuance. These approaches are designed to protect aquatic life and human health. Pollutant specific approaches such as those in the Gold Book and State Regulations address individual chemicals, whereas whole effluent toxicity (WET) approaches evaluate interactions between pollutants thus rendering and "overall" or "aggregate" toxicity assessment of the effluent. Furthermore, WET measures the "additive" and/or "antagonistic" effects of individual chemical pollutants which pollutant specific approaches do not, thus the need for both approaches. In addition, the presence of an unknown toxic pollutant can be discovered and addressed through this process.

Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts and New Hampshire law states that, "all waters shall be free from toxic substances or chemical constituents in concentrations or combination that injure or are inimical to plants, animals, humans, or aquatic life; ...." (NH RSA 485-A:8, VI and the NH Code of Administrative Rules, PART Env-Ws 1703.21). The federal NPDES regulations at 40 CFR §122.44(d)(1)(v) require whole effluent toxicity limits in a permit when a discharge has a "reasonable potential" to cause or contribute to an excursion above the State's narrative criteria for toxicity. Inclusion of the whole effluent toxicity limit in the draft permit will demonstrate the compliance with narrative water quality criteria of "no toxics in toxics amounts" found in both the CWA and State of New Hampshire regulations.

The previous permit (effective date April 1, 2001) required toxicity testing four times a year with an LC50 limit of 100%. The required test species are mysid shrimp (*Mysidopsis bahia*) and inland silverside (*Menidia beryllina*). On August 23, 2002, the Town requested a reduction in toxicity test frequency to two per year because the Town had four consecutive test results in compliance with the permit limits. In a letter dated September 11, 2003, EPA reduced the toxicity testing frequency to two per year. Testing is required for the calendar quarters ending March 31st and September 30th. The existing toxicity testing requirement has been carried forward to the current draft permit.

Toxicity testing frequency may be reduced, to not less than once per year, after the completion of a minimum of the most recent four successive toxicity tests of effluent, all of which must be valid tests and demonstrate compliance with the permit limits for whole effluent toxicity. Any requests for toxicity testing frequency reduction must be made to EPA-New England in writing. If toxicity persists in the effluent, monitoring frequency and testing requirements may be increased. The permit may also be modified, or alternatively revoked and reissued, to incorporate additional toxicity testing requirements or chemical specific limits. These actions will occur if the Regional Administrator determines the NH standards are not adequately enforced and users of the receiving water are not adequately protected during the remaining life of the permit. Results of these toxicity tests are considered "new information not available at the permit development", therefore, the permitting authority is allowed to use said information to modify and issued permit under authority in 40 C.F.R. §122.62(a)(2).

g. Combined Sewer Overflows (CSOs)

One CSO remains active (Outfall 003). The location of this CSO discharge into Clemson Pond is shown on Attachment A. The previous permit established CSO Outfall 003 (discharge to Clemson Pond) and eliminated Outfall 002 (outlet from Clemson Pond). This change was made because it was determined that Clemson Pond should be classified as a "Water of the United States". The draft permit carries forward this determination and authorizes discharges from CSO Outfall 003 into Clemson Pond under certain conditions. The permit also includes a condition to monitor the CSO flow into Clemson Pond and at the outlet of Clemson Pond once per quarter for the first year of the permit. Parameters to be sampled include Fecal Coliform Bacteria, Enterococci Bacteria, salinity, and temperature. This monitoring is necessary to ensure that designated used of the receiving waters are maintained. If the monitoring data reveals the need to add additional limits or conditions, the permit may be modified or alternatively revoked and reissued.

The following discussion explains the final EPA National CSO Policy, published in April 19, 1994 in the Federal Register (59 FR 18688). Specific requirements in the draft permit include: dry-weather overflow prohibition, nine minimum controls, and documentation of the implementation of these nine minimum controls, and compliance with water quality standards.

General

CSOs are discharges from a combined storm water and wastewater sewer system into a receiving water without first going to the headworks of a publicly owned treatment works (POTW). CSOs occur when the flow in the combined sewer system exceeds interceptor or regulator capacity. CSOs are distinguished from bypasses which are "intentional diversions of waste streams from any portion of a treatment facility" (40 C.F.R. §122.41(m)).

Flows in combined sewers can be classified into two categories: wet-weather flow and dry-weather flow. Wet-weather flow is a combination of domestic and industrial sewage, infiltration from groundwater, and storm water flow including snow melt. Dry-weather flow is a combined sewer that results from domestic sewage, groundwater infiltration, and industrial wastes, with no contribution from storm water runoff or storm water induced infiltration. Dry-weather overflows from CSOs are illegal. They must be reported immediately to EPA and eliminated as expeditiously as possible.

The objectives of the National CSO Control Policy are to: (1) Ensure that if the CSO discharges occur, they are only as a result of wet-weather, (2) Bring all wet-weather CSO discharge points into compliance with the technology-based requirements of the CWA and applicable Federal and State water quality standards, and (3) Minimize water quality, aquatic biota, and human health impacts from wet-weather flows.

Effluent Standards

CSOs are point sources subject to both water quality-based and technology-based NPDES permit requirements. However, they are not subject to secondary treatment regulations. Section 301(b)(1)(C) of the CWA of 1977 mandates compliance with Federal and State water quality standards by July 1, 1977. Technology-based permit limits must be established for BPT, BCT, and BAT based on BPJ in accordance with Section 301(b) and Section 402(a) of the Water Quality Act Amendments of 1987.

Conditions for Discharge

The draft permit prohibits dry-weather discharges from CSO outfalls. During wet-weather, the discharges must not cause violations of Federal and State water quality standards. Dry-weather discharges must be reported immediately to EPA and the NHDES-WD. Wet-weather discharges must be monitored and reported as specified in the permit.

Nine Minimum Controls (NMC)

The permittee must comply with BPJ-derived BCT/BAT controls, which at a minimum include the following: (1) Proper operation and maintenance of the sewer system and outfalls; (2) Maximum use of the collection systems for storage; (3) Review of pretreatment programs to assure CSO impacts are minimized; (4) Maximization of flow to the POTW for treatment; (5) Prohibition of dry-weather flows; (6) Control of solid and floatable materials in the discharge; (7) Pollution prevention programs which focus on contaminant reduction activities; (8) Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts; and (9) Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

Documentation

Exeter prepared a report in April, 1997 documenting compliance with the nine minimum controls. The permit requires this report to be updated to reflect updates to the system and any changes (if applicable) to the nine minimum controls. Approvable documentation must demonstrate implementation of the nine minimum controls, including schedules for completing minor construction activities. This documentation must include a detailed analysis of specific activities the permittee has undertaken and will undertake to implement the nine minimum controls and additional controls beyond the nine minimum controls the permittee can feasibly implement. The specific activities included in the documentation must include minimum requirements set forth in Part I.F.1. of the draft permit and additional activities the permittee can feasibly undertake. This documentation will constitute the specific activities and levels of control required under this permit along with any revisions that may be required.

Documentation may include operation and maintenance plans, revised sewer use ordinances for industrial users, sewer system inspection reports, infiltration/inflow studies, pollution prevention programs, public notification plans and facility plans for maximizing the capacities of the existing collection system, as well as contracts and schedules for minor construction programs for improving the existing systems operation. This documentation shall also include information which indicates the degree to which the controls achieve compliance with water quality standards.

h. Industrial Users

The permittee is presently not required to administer a pretreatment program based on the authority granted under 40 C.F.R. §122.44(j), 40 C.F.R. §403 and Section 307 of the CWA. However, the draft permit contains conditions which are necessary to allow EPA and NHDES-WD to ensure that pollutants from industrial users will not pass through the facility and cause water quality standards violations and/or sludge use and disposal difficulties or cause interference with the operation of the treatment facility.

The permittee is required to notify EPA and NHDES-WD whenever a process wastewater discharge to the facility from a primary industrial category (see 40 C.F.R. §122 Appendix A for list) is planned or if there is any substantial change in the volume or character of pollutants being discharged into the facility by a source that was discharging at the time of issuance of the permit. The permit also contains the requirements to: 1) report to EPA and NHDES-WD the name(s) of all industrial users subject to Categorical Pretreatment Standards (see 40 C.F.R. §403 Appendix C as amended) pursuant to 40 C.F.R. §403.6 and 40 C.F.R. Chapter I, Subchapter N (Parts 405-415, 417-436, 439-440, 443, 446-447, 454-455, 457-461, 463-469, and 471 as amended) and/or New Hampshire Pretreatment Standards (ENV-Ws 904) who commence discharge to the POTW after the effective date of the finally issued permit; and 2) submit two EPA and NHDES-WD copies of Baseline Monitoring Reports and other pretreatment reports submitted by industrial users.

i. Operation and Maintenance

Regulations regarding proper operation and maintenance are found at 40 C.F.R. § 122.41(e). These regulations require, "that the permittee shall at all times operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of the permit." The treatment plant and the collection system are included in the definition "facilities and systems of treatment and control" and are therefore subject to proper operation and maintenance requirements.

Similarly, a permittee has a "duty to mitigate" pursuant to 40 C.F.R. § 122.41(d), which requires the permittee to "take all reasonable steps to minimize or prevent any discharge in violations of the permit which has a reasonable likelihood of adversely affecting human health or the environment."

General requirements for proper operation and maintenance, and mitigation have been included in Part II of the permit. Specific permit conditions have also been included in Part I.B., I.C., and I.D. of the draft permit. These requirements include mapping of the wastewater collection system, reporting of unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling inflow and infiltration to the extent necessary to prevent SSOs and I/I related effluent violations at the wastewater treatment plant, and maintaining alternate power where necessary.

j. Sludge

Section 405(d) of the CWA requires that EPA develop technical standards regulating the use and disposal of sewage sludge. These regulations were signed on November 25, 1992, published in the Federal Register on February 19, 1993, and became effective on March 22, 1993. Domestic sludge which is land applied, disposed of in a surface disposal unit, or fired in a sewage sludge incinerator are subject to Part 503 technical standards. Part 503 regulations have a self implementing provision, however, the CWA requires implementation through permits. Domestic sludge which is disposed of in a municipal solid waste landfill is in compliance with Part 503 regulations provided that the sludge meets the quality criteria of the landfill and the landfill meets the requirements of 40 C.F.R. Part 258.

The draft permit requires that sewage sludge use and disposal practices meet Section 405(d) Technical Standards of the CWA. In addition, the EPA Region I – NPDES Permit Sludge Compliance Guidance document dated November 4, 1999 is included with the draft permit for use by the permittee in determining their appropriate sludge conditions for their chosen method of sludge disposal. The permittee is required to submit to EPA and to NHDES-WD annually, by February 19th, the various sludge reporting requirements as specified in the guidance document for the chosen method of sludge disposal.

Sludge generated by the Exeter Wastewater Treatment Plant is placed in an on-site sludge storage lagoon.

k. Essential Fish Habitat and Endangered Species

A. <u>Essential Fish Habitat</u>

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104267), established a new requirement to describe and identify (designate) "essential fish habitat" (EFH) in each federal fishery management plan. Only species managed under a federal fishery management plan are covered. Fishery Management Councils determine which area will be designated as EFH. The Councils have prepared written descriptions and maps of EFH, and include them in fishery management plans or their amendments. EFH designations for New England were approved by the Secretary of Commerce on March 3, 1999.

The 1996 Sustainable Fisheries Act broadly defined EFH as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Waters include aquatic areas and their associated physical, chemical, and biological properties. Substrate includes sediment, hard bottom, and structures underlying the waters. Necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers all habitat types utilized by a species throughout its life cycle. Adversely affect means any impact which reduces the quality and/or quantity of EFH. Adverse impacts may include direct (i.e. contamination, physical disruption), indirect (i.e. loss of prey), site specific or habitat wide impacts including individual, cumulative, or synergistic consequences of actions.

According to the Guide to Essential Fish Habitat Designations in the Northeastern United States; Volume I: Maine and New Hampshire, March 1999, Great Bay, into which the Squamscott River flows, has been designated as EFH for the species listed in Attachment D.

EPA has concluded that the limits and conditions contained in this draft permit minimize adverse effects to EFH for the following reasons:

- The permit requires twice per year toxicity testing using mysid shrimp and inland silversides to ensure that the discharge does not present toxicity problems;
- The permit prohibits the discharge to cause a violation of state water quality standards;
- The permit contains water quality base limits for ammonia and total residual chlorine.

EPA believes the draft permit adequately protects EFH and therefore additional mitigation is not warranted. NMFS will be notified and an EFH consultation will be reinitiated if adverse impacts to EFH are detected as a result of this permit action or if new information is received that changes the basis for these conclusions.

B. Endangered Species

The Endangered Species Act (16 U.S.C. 1451 et seq), Section 7, requires the EPA to ensure, in consultation with the U.S. Fish and Wildlife Service (USFWS) and/or NMFS, as appropriate, that any action authorized by EPA is not likely to jeopardize the continued existence of any endangered or threatened species, or adversely affect its critical habitat.

EPA believes that the authorized discharge from this facility is not likely to adversely affect and federally listed species or their habitats. EPA is informally consulting with USFWS and NMFS to confirm this determination.

V. Antidegradation.

This draft permit is being reissued with limitations that are the same as those in the existing permit. There is no change in the outfall locations. Since the State of New Hampshire has indication there will be no lowering of water quality and no loss of existing uses, no additional antidegradation review is needed.

VI. State Certification Requirements.

EPA may not issue a permit unless the State Water Pollution Control Agency with jurisdiction over the receiving water(s) either certifies that the effluent limitations and/or conditions contained in the permit are stringent enough to assure, among other things, that the discharge will not cause the receiving water to violation NH standards or waives its right to certify as set forth in 40 C.F.R. §124.53.

Upon public noticing of the draft permit, EPA is formally requesting that the State's certifying authority make a written determination concerning certification. The State will be deemed to have waived its right to certify unless certification is received within 60 days of receipt of this request.

The NHDES-WD, Wastewater Engineering Bureau is the certifying authority. EPA has discussed this draft permit with the staff of the Wastewater Engineering Bureau and expects that the draft permit will be certified. Regulations governing state certification are set forth in 40 C.F.R. §§ 124.53 and 124.55.

The State's certification should include the specific conditions necessary to assure compliance with applicable provisions of the CWA, Sections 208(e), 301, 302, 303, 306, and 307 and with appropriate requirements of State law. In addition, the State should provide a statement of the extent to which each condition of the draft permit can be made less stringent without violating the requirements of State law. Since the State's certification is provided prior to permit issuance, any failure by the State to provide this statement waives the State's right to certify or object to any less stringent condition. These less stringent conditions may be established by EPA during the permit issuance process based on information received following the public notice of the draft permit. If the State believes that any conditions more stringent than those contained in the draft permit are necessary to meet the requirements of either the CWA or State law, the State should include such conditions and, in each case, cite the CWA or State law reference upon which that condition is based. Failure to provide such a citation waives the right to certify as to that condition.

Reviews and appeals of limitations and conditions attributable to State Certification shall be made through the applicable procedures of the State and may not be made through the applicable procedures set forth in 40 C.F.R. Part 124.

VII. Comment Period, Hearing Requests, and Procedures for Final Decisions.

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to:

Dan Arsenault
U.S. Environmental Protection Agency
One Congress Street
Suite 1100 (Mail Code CMP)
Boston, Massachusetts 02114-2023
Telephone: (617) 918-1562
Fax: (617) 918-1505

Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such Requests shall state the nature of the issue proposed to be raised at the hearing. A public hearing may be held after at least thirty (30) days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after a public hearing (if applicable), the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the final permit decision, any interested person may submit a request for a formal hearing to reconsider or contest the final decision. Requests for a formal hearing must satisfy the requirement of 40 C.F.R. §124.74.

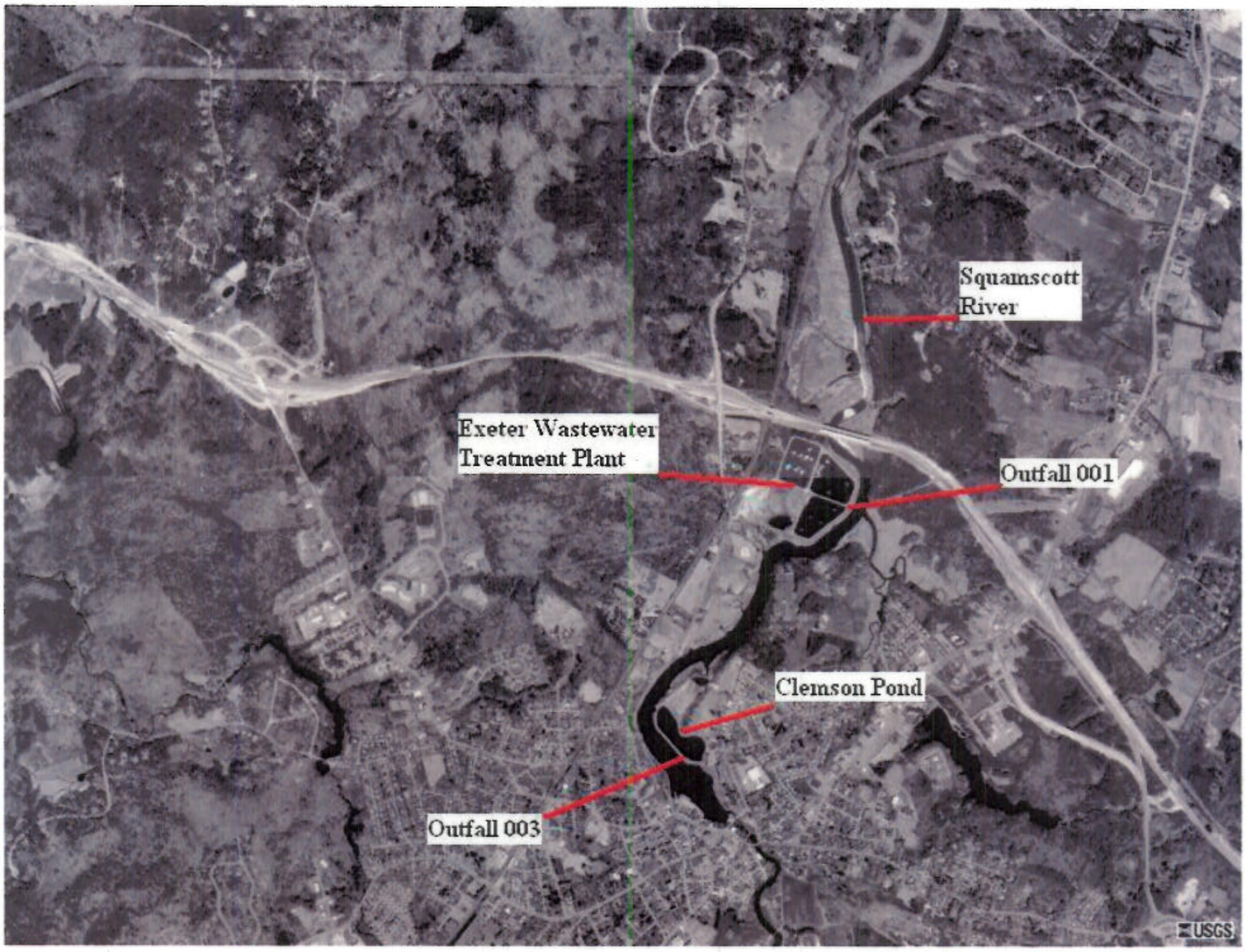
Information concerning the draft permit may be obtained between the hours of 9:00 am and 5:00 pm, Monday through Friday, excluding holidays.

10/9/07
Date

Stephen S. Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

ATTACHMENT A

EXETER WASTEWATER TREATMENT PLANT LOCATION



* Aerial photo obtained from www.terraserver.microsoft.com. Photo taken April 11, 1998.

ATTACHMENT B

SUMMARY OF EFFLUENT CHARACTERISTICS AT OUTFALL 001

The following effluent characteristics were derived from analysis of discharge monitoring data collected from Outfall 001 from October 2000 through April 2006. All data taken from the monthly Discharge Monitoring Reports as retrieved from EPA's Permit Compliance System (PCS) data base. These effluent values characterize the treated wastewater discharged from this facility.

Effluent Parameter	Average of Monthly Averages	Range of Monthly Averages	Maximum of Daily Maximums[1]
Effluent Flow (mgd)	2.0	0.9 – 3.5	7.7, 5.9, 5.1
BOD_5 (mg/l)	10	3 - 23	43, 28, 25
BOD_5 (lb/day)	181	22 - 499	1434, 1083, 841
TSS (mg/l)	15	4 - 29	38, 36, 32
TSS (lb/day)	264	30 - 777	951, 921, 841
pH (standard units)[2]	---	6.5 – 7.9	---
Fecal coliform (colonies/100ml)	1.6	0 - 8	41, 43, 32
Total Residual Chlorine (mg/l)	0.006	0 – 0.024	0.055, 0.045, 0.035
BOD_5 Removal (percent)	92	78 – 97	78, 82, 83[3]
TSS Removal (percent)	89	75 – 97	75, 78, 80[3]
LC50 (percent effluent) *Mysidopsis bahia*	---	---	64.5, 74.7, >100[3]
LC50 (percent effluent) *Menidia beryllina*	---	---	>100[3]
Ammonia Nitrogen as Nitrogen (mg/l) (May through October)	7.42	0.1 – 19.5	24, 21, 20
Ammonia Nitrogen as Nitrogen (mg/l) (November through April)	15.64	1.8 - 28	34, 32, 30
Total Recoverable Cadmium (mg/l)	---	---	0.008, 0.005, 0.002
Total Recoverable Chromium (mg/l)	---	---	0.008, 0.004, 0.003
Total Recoverable Copper (mg/l)	---	---	0.01, 0.013, 0.012
Total Recoverable Nickel (mg/l)	---	---	0.008, 0.006, 0.005
Total Recoverable Lead (mg/l)	---	---	0.055, 0.021, 0.013
Total Recoverable Zinc (mg/l)	---	---	0.084, 0.0775, 0.076

1. More than one value represents the second and third highest values.
2. Numbers listed are the minimum and maximum daily readings.
3. Number listed represent lowest values reported.

ATTACHMENT C

BOD_5 AND TSS EFFLUENT MASS LIMIT CALCULATIONS

Concentration Limits for BOD_5 and TSS: Monthly Average = 30 mg/l
Weekly Average = 45 mg/l
Daily Maximum = 50 mg/l

Plant Design Flow = 3.0 mgd = 3,000,000 gal/d

Average Monthly Mass Limit:

(30 mg/liter)(3,000,000 gal/d)(1 gram/1000 mg)(1 lb/ 454 gram)(3.785 liter/gal) = 751 lb/d

Average Weekly Mass Limit:

(45 mg/liter)(3,000,000 gal/d)(1 gram/1000 mg)(1 lb/ 454 gram)(3.785 liter/gal) = 1,126 lb/d

Maximum Daily Limit:

(50 mg/liter)(3,000,000 gal/d)(1 gram/1000 mg)(1 lb/ 454 gram)(3.785 liter/gal) = 1,251 lb/d

ATTACHMENT D

EFH DESIGNATIONS FOR GREAT BAY

Species	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Atlantic salmon (*Salmo salar*)			F,M		
Atlantic cod (*Gadus morhua*)	S	S			
haddock (*Meanogrammus aeglefinus*)	S	S			
pollack (*Pollachius virens*)	S	S	S		
red hake (*Urophycis chuss*)			S	S	
white hake (*Urophycis tenuis*)	S		S	S	
redfish (*Sebastes fasciatus*)	n/a				
winter flounder (*Pleuronectes americanus*)	M,S	M,S	M,S	M,S	M,S
yellowtail flounder (*Pleuronectes ferruginea*)	S	S			
windowpane flounder (*Scopthalmus aquosus*)	S	S	S	S	S
Atlantic halibut (*Hippoglossus hippoglossus*)	S	S	S	S	S
Atlantic sea scallop (*Placopecten magellanicus*)			S	S	
Atlantic sea herring (*Clupea harengus*)		M,S	M,S		
bluefish (*Pomatomus saltatrix*)			M,S	M,S	
long finned squid (*Loligo pealei*)	n/a	n/a			
short finned squid (*Illex illecebrosus*)	n/a	n/a			
Atlantic mackerel (*Scomber scombrus*)	M,S	M,S	S		
surf clam (*Spisula solidissima*)	n/a	n/a			
ocean quahog (*Artica islandica*)	n/a	n/a			
spiny dogfish (*Squalus acanthias*)	n/a	n/a			

S = The EFH designation for this species includes the seawater salinity zone of the bay (salinity > or = 25.0 $^{o}/_{oo}$).

M = The EFH designation for this species includes the mixing water/brackish salinity zone of this bay (0.5 $^{o}/_{oo}$ < salinity < 25.0 $^{o}/_{oo}$).

F = The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 $^{o}/_{oo}$ < or = salinity < or = 0.5 $^{o}/_{oo}$)

n/a = The species does not have this lifestage in its life history or has not EFH designated for this lifestage.